# DIESEL PROGRESS

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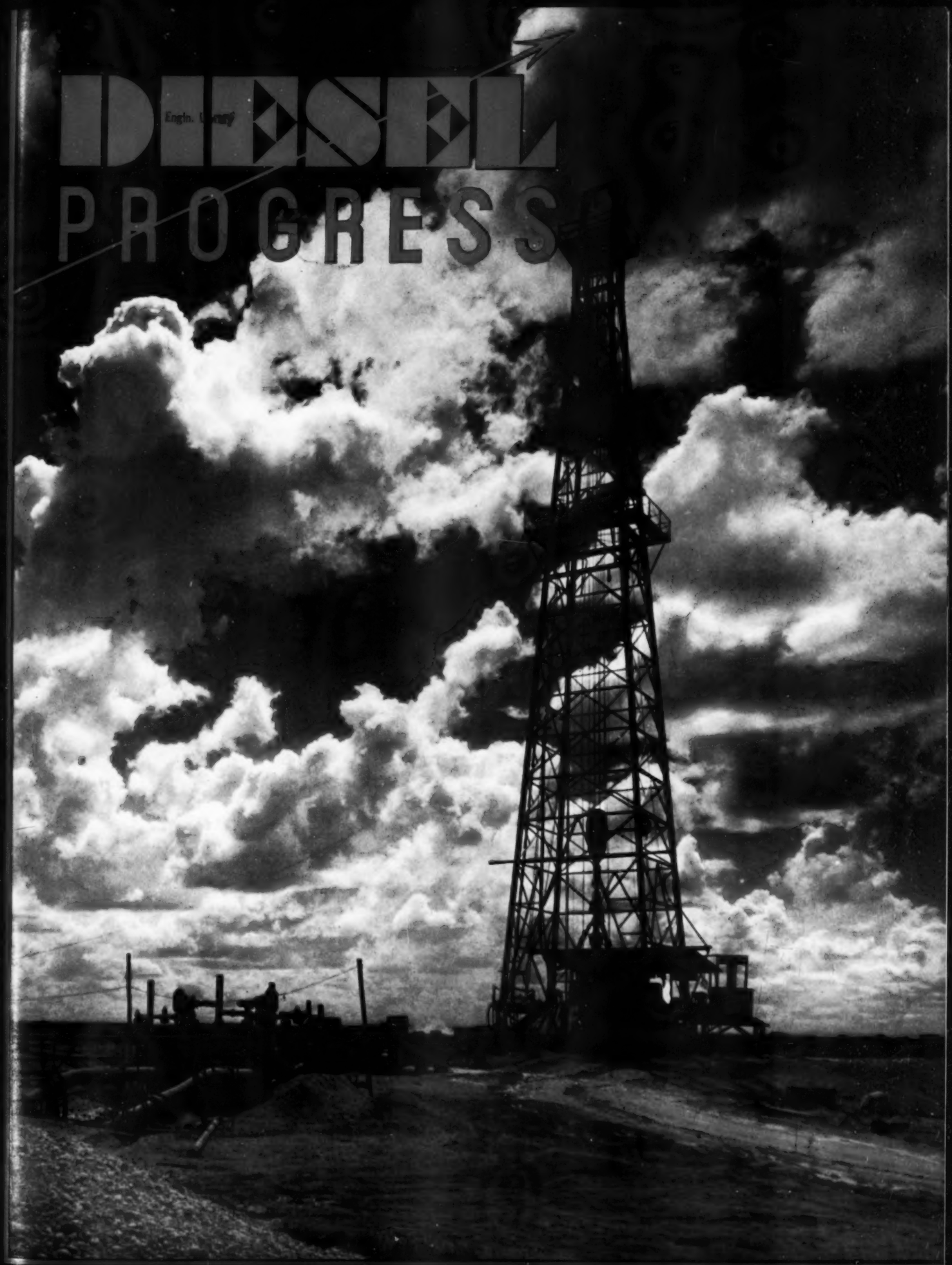

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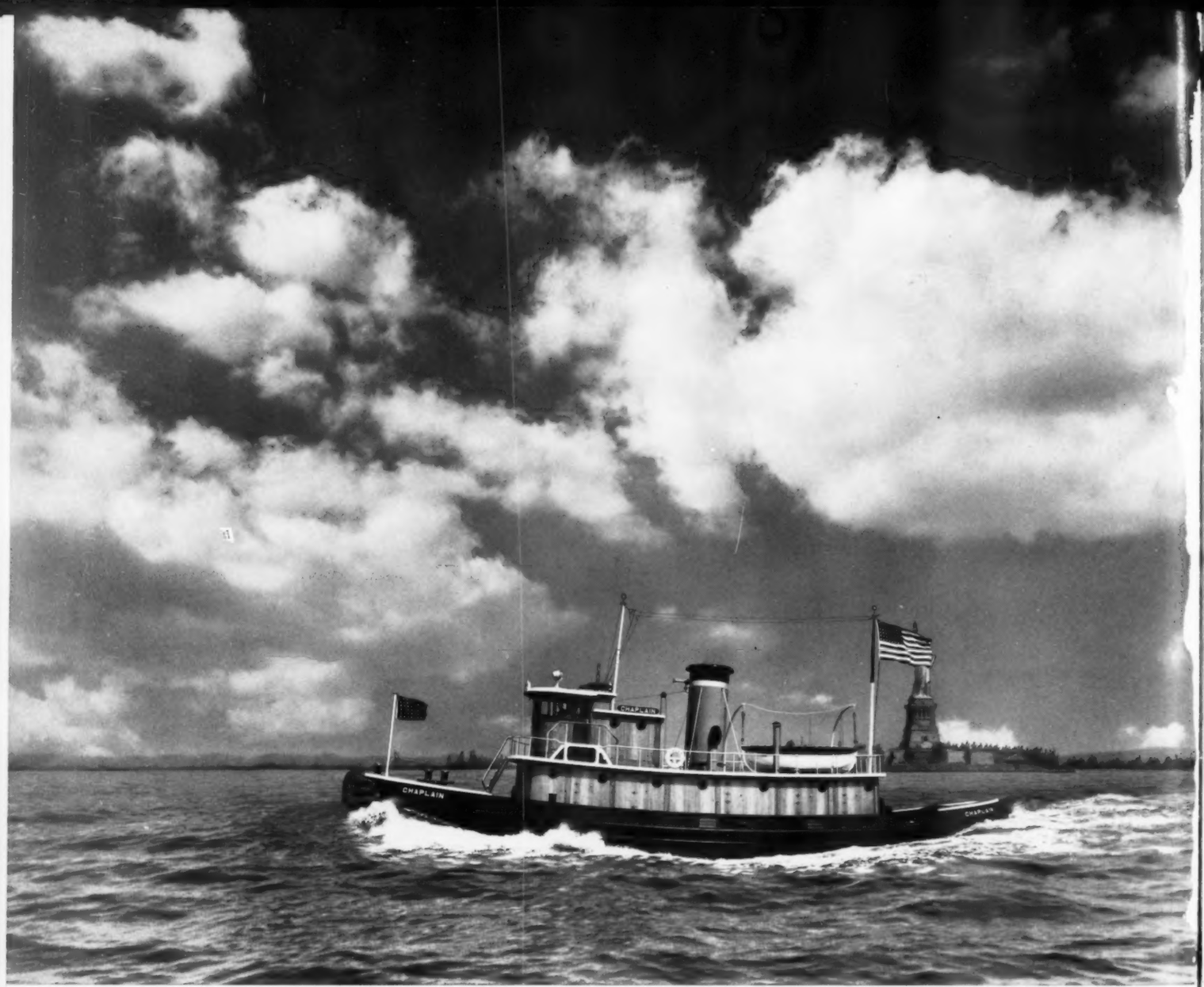


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# DIESEL PROGRESS and DIESEL AVIATION

## CONTENTS MAY, 1940




**REX W. WADMAN**
***Editor and Publisher***


FRONT COVER ILLUSTRATION: A typical camera study by Robert Yarnall Richie taken on his recent visit to Venezuela. The International Petroleum Exposition opens in Tulsa on May 18 and runs through to May 25. This important Industrial Exposition promises to be even more heavily Dieselized than it was two years ago.

TABLE OF CONTENTS ILLUSTRATION: America's newest type of locomotive, a Diesel freight locomotive rated at 5400 hp., built by the Electro-Motive Corporation. This photograph was taken at the Auburn Transfer Yards of the Northern Pacific, where it ran tests on heavy trans-Cascade Mountain freight trains with 2500 tons up and down a 2.2 per cent grade with forty loaded cars. No helper engine was used or needed. Standing beside it is one of the Northern Pacific's 4000 Series Mallet Steam locomotive. Two of these steamers are necessary to handle the train successfully operated by this new Diesel freight locomotive.


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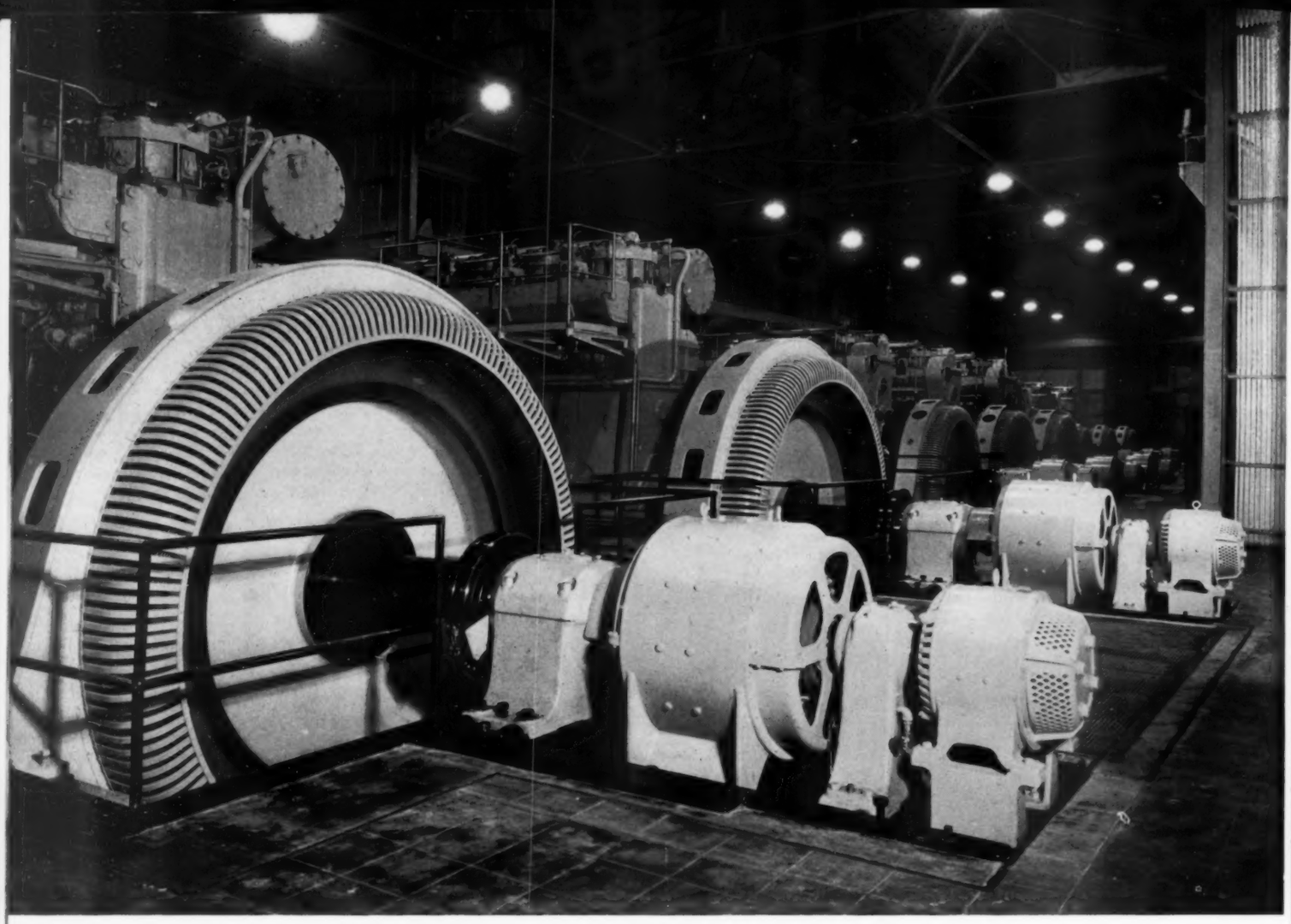


*Night view of the Brawley, California, Diesel Plant of the Imperial Irrigation District.*

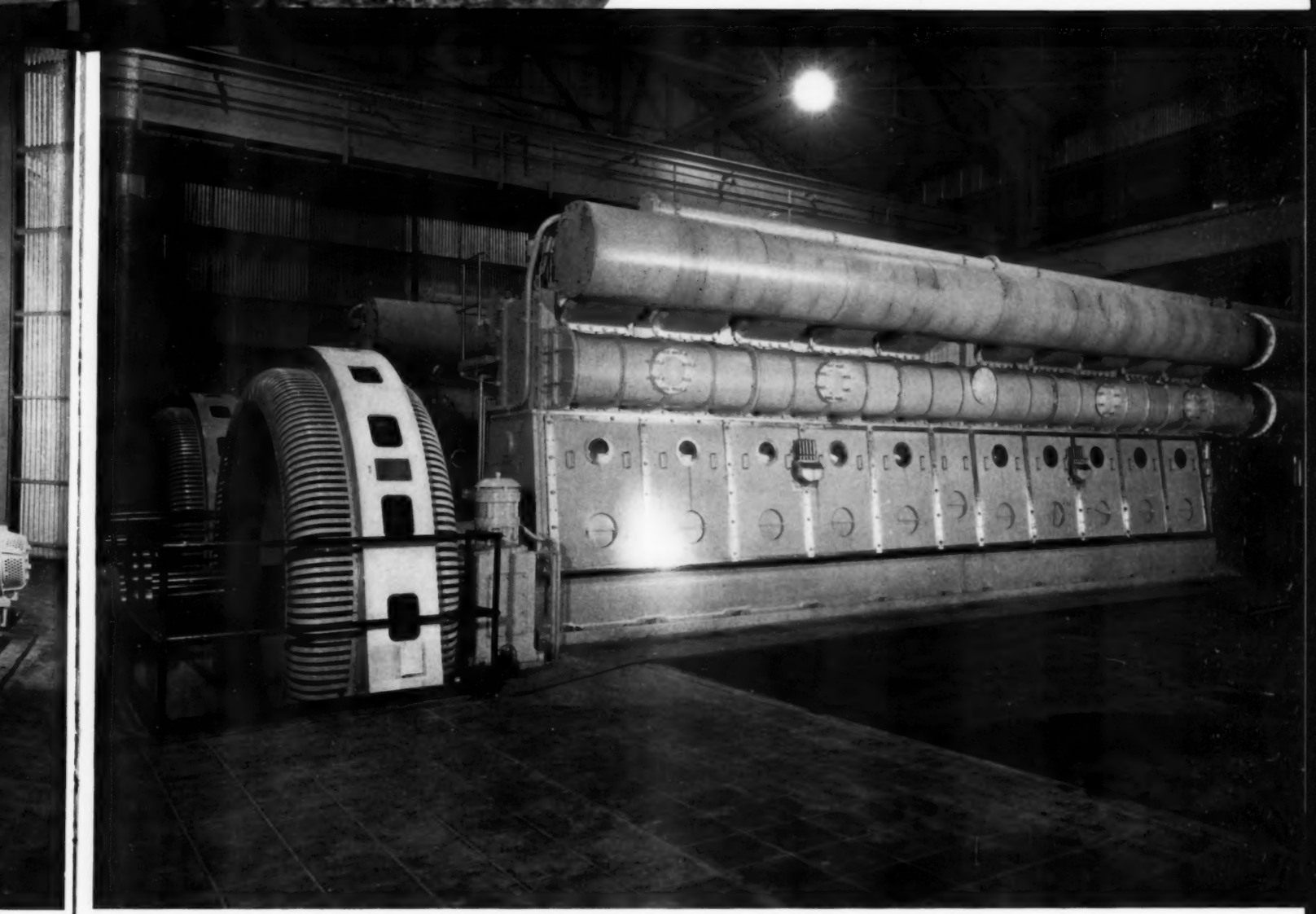
# BRAWLEY, CALIFORNIA . . . F

*By* REX W. WADMAN

BRAWLEY, California,, March 18, 1940—Forty-seven similar cylinders, an all world record, is one of the outstanding features of the Brawley Diesel plant of the Imperial Irrigation District. On top of that, it is the largest Diesel plant in the U. S. A., in point of installed horsepower, in full service.

I came down into the Valley again today for the third time in four years. This plant intrigues me; the whole operation down here is tremendously interesting. My first visit was in January, 1937, and a descriptive article on the initial Diesel installation at Brawley appeared in the February, 1937, issue of DIESEL PROGRESS. My next trip was in January, 1939, and the result of that visit showed up on pages 34 to 39 of our February, 1939, issue. Now we give you the third Brawley story, the saga of a Diesel plant which has grown from 3,300 hp. to 18,340 hp. in less than five years; that has grown from nine cylinders of the same size, type and make to forty-seven similar cylinders: A Diesel plant which is helping to make thousands of hitherto arid acres produce bountiful and valuable crops: A Diesel plant which is helping to make living more comfortable, more economical for thousands of families down here in the Imperial Valley, where 120° in the shade is not uncommon and where there "ain't no shade."

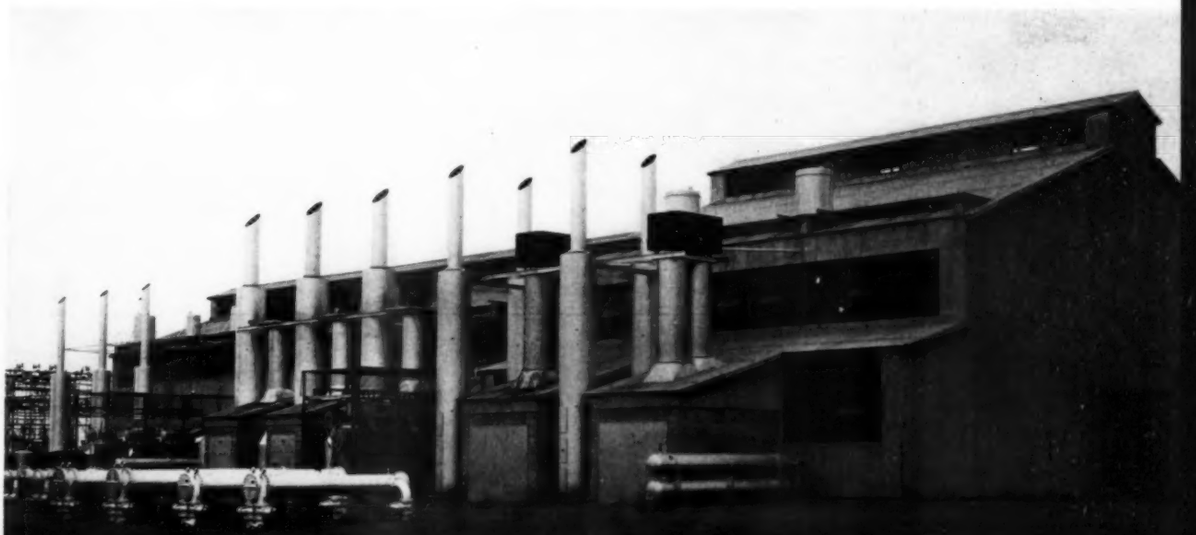
The February, 1937, article dealt with the initial installation here of three Hamilton, three cylinder, two cycle, 21½" x 27½", Diesel engines manufactured by the Hooven, Owens, Rentschler Divsion of the General Machinery Corporation. The second article, in the February, 1939, issue, covered the installation of three additional Hamilton units, this time six cylinder, two cycle, 21½" x 27½" engines. This article specifically deals with the latest addition



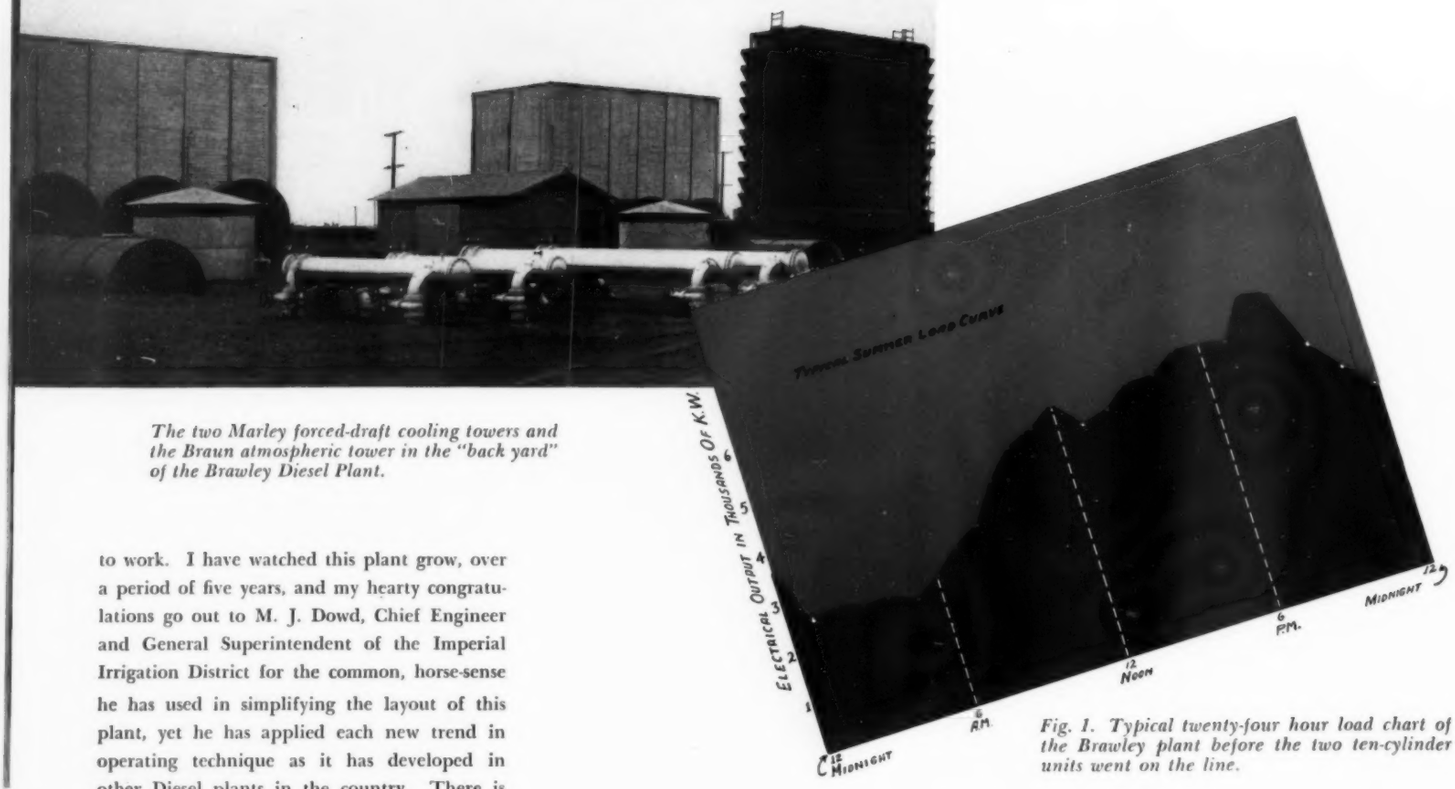
*The two new 10 cylinder, 21½" x 27½", two cycle Hamilton Diesel engines recently installed at Brawley.*

# FORTY-SEVEN SIMILAR CYLINDERS

to this unique plant—a pair of ten cylinder, 21½" x 27½", two cycle Hamilton Diesel engines. As the plant now stands, it contains eight engines with a net capacity of 12,000 kw. and rated at 18,340 hp. = Forty-seven similar cylinders, all 21½" x 27½"—nothing quite like it in the world. This standardization of cylinders makes possible a unique shop maintenance schedule. The efficiency of the floor crew is much higher, because they are dealing with the same units all the time, regardless of the number of cylinders on any engine. Spare part inventory is lower—all in all, this Brawley plant is worth studying. It is a simple installation, yet every necessary accessary, every usable gadget is doing a job here. The arrangement of the accessory bay running the length of the engine room and on a lower level is highly efficient. All pipes, valves, fittings, etc., are get-at-able in a well ventilated, well lighted, dry basement with plenty of headroom in which



*General exterior of the Brawley Diesel Plant showing Braun heat exchangers in foreground, Maxim exhaust silencers, Burgess intake silencers, and American Air filters as installed for each of the eight engines.*




*The two Marley forced-draft cooling towers and the Braun atmospheric tower in the "back yard" of the Brawley Diesel Plant.*

*Fig. 1. Typical twenty-four hour load chart of the Brawley plant before the two ten-cylinder units went on the line.*

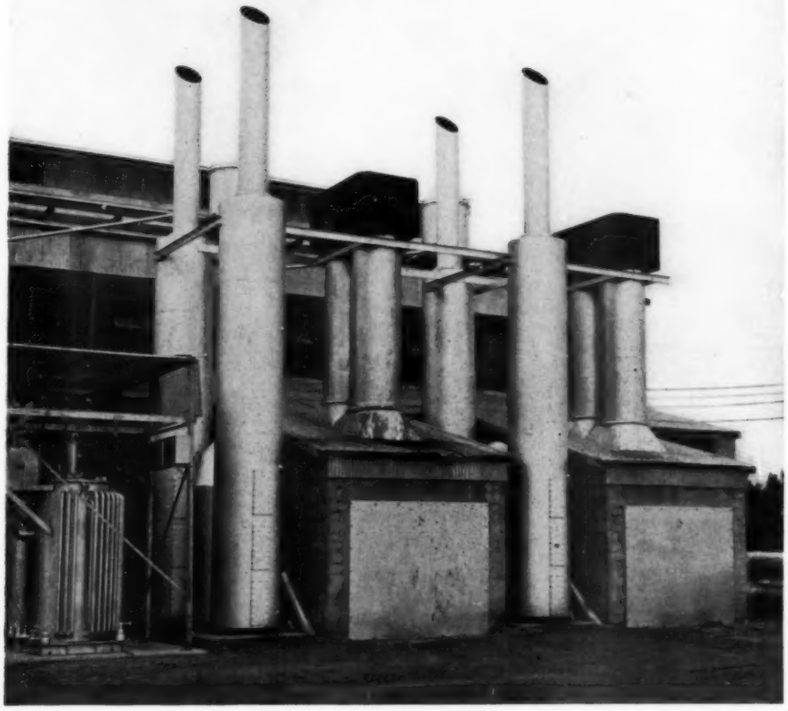
to work. I have watched this plant grow, over a period of five years, and my hearty congratulations go out to M. J. Dowd, Chief Engineer and General Superintendent of the Imperial Irrigation District for the common, horse-sense he has used in simplifying the layout of this plant, yet he has applied each new trend in operating technique as it has developed in other Diesel plants in the country. There is an orderly, efficient air around this plant; no rushing around; each man knows his job and does it quietly, effectively. There is room in which to work, good tools with which to work, and eight good engines to carry the load. I consider the Brawley Diesel plant one of the really outstanding installations in this country, not only because of its size, but because of the simplicity of its layout and the efficiency of its operation.

The peak load graph (Figure 1) covers a typical twenty-hour period last June, before the two ten cylinder units went on the line. It will be noticed the peak was 5,960 kw. at 8 p.m. and the low was 2,300 kw. at 5 a.m. The average production last year was 12.34 kwh. per gallon of fuel oil which figure compares favorably with the national average.

All of the eight engines in this plant are single-acting, trunk piston, two-cycle, 21½" x 27½" Hamilton Diesel engines operating at 240 rpm. The engines are simple in design and the latest expression of engineers of one of the oldest engine manufacturers in this country. They are solid injection, of course, employing patented direct water cooled fuel valves. These engines are also unique in the design of the fuel pump drive. The cams for the fuel oil pumps are bolted directly to the crankshaft webs only in the case of the 3-cylinder units. The 6-cylinder units and 10-cylinder units have camshafts the full length of the engines. These shafts are mounted on the side opposite the intake and exhaust manifolds and are near the top end of the cylinder. Gears connecting this camshaft with the main crankshaft are placed on the generator end in the case of the 6-cylinder units, and between cylinders 5 and 6 on the 10-cylinder units. The lube oil pumps for the 6- and 10-cylinder units are the attached type, but the water pumps are separate motor-driven units located in the basement.

Pistons are forged steel with cast iron skirts. There are five piston rings and two scraper rings, all American Hammered. There is no separate scavenging manifold, the space around the cylinders being enclosed by means of removable doors and acting as a scavenging air receiver. Pistons are oil-cooled and a box provided with glass windows is located on the side of the engine. This box has a visible discharge from each piston and also thermometers on each discharge line. The exhaust manifold is bolted to the side of the engine and the exhaust pipes going to the outside are connected to the engines by means of expansion joints of the stuffing box type. The exhaust pipes lead to separate concrete pits outside and Maxim silencers are bolted on the pits and supported by braces from the steelwork of the building. This design results in extremely quiet operation; the exhaust cannot be heard even standing close by, and not at all in the residential section about a city block away.

The lube oil sump tanks have a capacity of 900 gallons each for the 3- and 6-cylinder engines, but the ones for the two 10-cylinder units have a capacity of 1,500 gallons each. The lube oil pumps for the 6-cylinder engines have a capacity of 385 gallons a minute each and 600 gallons a minute for the 10-cylinder units. The oil coolers are C.F. Braun in the case of the 3- and 6-cylinder installations, but those for the two new 10-cylinder units were

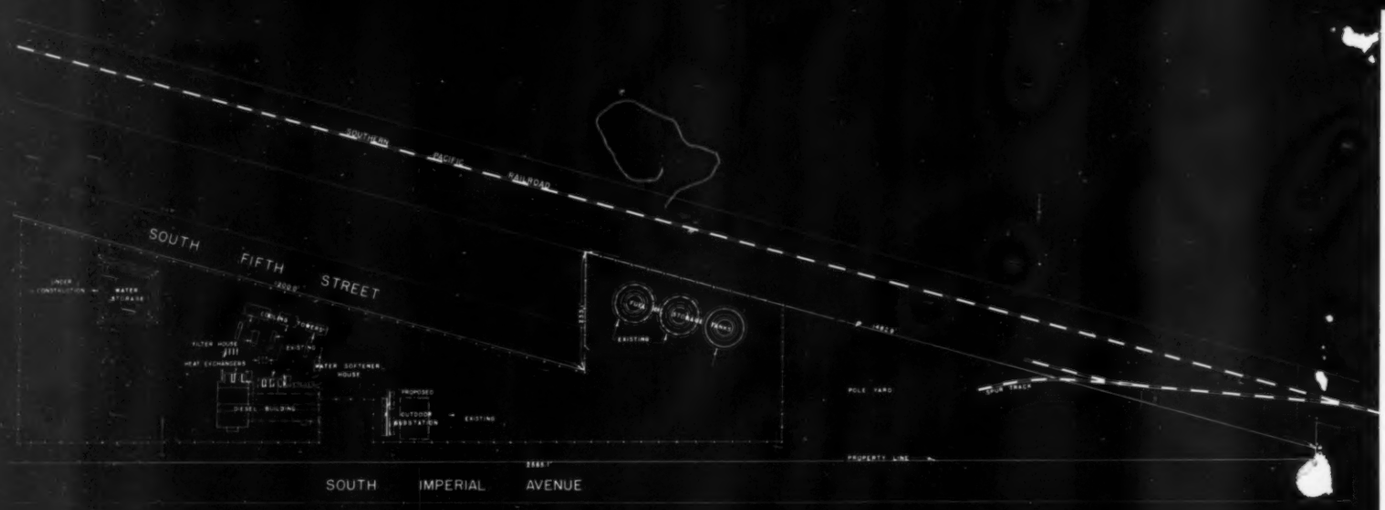


*Close up of the exhaust and intake arrangements for the two ten-cylinder units at Brawley showing how the American Air filters are mounted on top of the Burgess intake silencers, in turn leading into the scavenging blower room.*

manufactured by Condenser Service & Engineering Co. The strainers for the lube oil are Purolater. Texaco "Ursa" lube oil is used for crankcase and piston cooling; "Ursa" heavy for force feed cylinder lubrication. There is a centrifugal lube oil purifier installed for the battery of 3-cylinder engines, another one for the battery of 6-cylinder engines, and then a separate, distinct centrifuge for the two 10-cylinder engines.

The fuel is stored in three 2,250-barrel storage tanks; pumped from there to the fuel oil centrifuges, thence to the two 10,000-gallon underground service tanks. Individual fuel oil transfer pumps draw the oil from these clean oil tanks and pump it into the individual day tanks on the roof of the building. Nugent filters are used on the fuel lines to the engine for the three 3-cylinder units, but Purolaters are used with the 6- and 10-cylinder engines. The original fuel oil purifier has a capacity of 250 gallons per hour, and the new purifier added for the 10-cylinder engines has a capacity of 400 gallons per hour. Seven Petrometer distant-reading tank gauges are installed, one on each

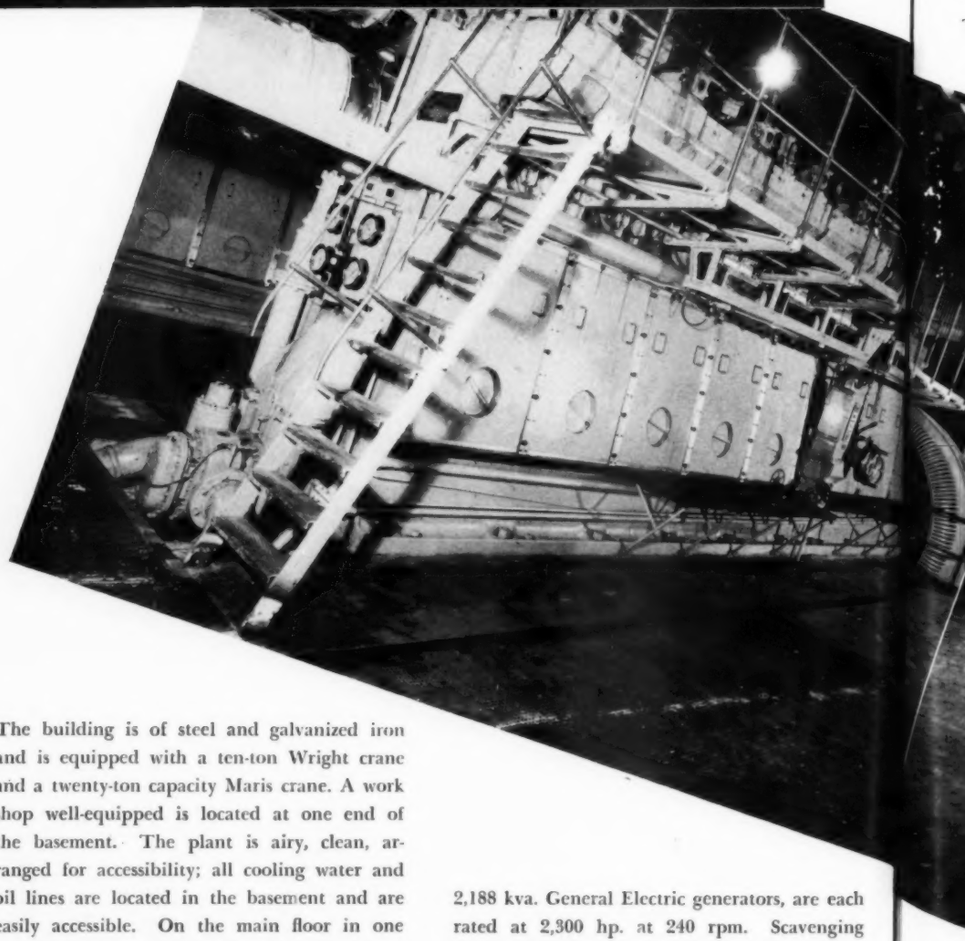
*Profile plan of the Brawley Diesel plant with dimensions covering the arrangement of the two ten-cylinder units*




of the day tanks for the 6-cylinder and 10-cylinder units, and one on the clean oil fuel tank buried in the yard on the east side of the plant. These gauges have been found very effective and efficient in maintaining an accurate check on the fuel level in the day tanks and in the clean oil tank.

One of the most interesting factors of this plant from an accessory standpoint is the manner in which air filtration has been handled and air intake silenced. For the three original engines, American Air Filter units were located inside the engine room in boxes fastened to the pillars in front of each engine and this system is still in effect for those engines. A pipe leads from the box to a Burgess silencer located under the floor and from there the pipe leads to the intake of the engine-driven blower, but when it came time to install the six cylinder units, which were equipped with motor-driven scavenging blowers, the question of silencing the air intake was an important factor and, as will be seen by the exterior photographs and by the profile view of the engine room, a unique and somewhat original layout was effected. Two large Burgess intake silencers were mounted on the roof of the blower room and a battery of American Air filters installed on top of the intake silencers, with the net result that the intake noise was completely silenced, air filtration was satisfactory, and one of the real problems of installing large 2-cycle engines was solved. The blowers for the 3-cylinder engines are the attached type manufactured by Roots-Connersville. Those for the 6- and 10-cylinder units are Allis-Chalmers motor-driven type. The large plate doors installed in the end wall of the scavenging blower vaults were constructed to provide easy removal of the blower units.

Fuel oil, obtained from a refinery in the Los Angeles Basin, averages about 24° Baume, 60 vis., 200 flash, 1½% carbon, blended stock.



The building is of steel and galvanized iron and is equipped with a ten-ton Wright crane and a twenty-ton capacity Maris crane. A work shop well-equipped is located at one end of the basement. The plant is airy, clean, arranged for accessibility; all cooling water and oil lines are located in the basement and are easily accessible. On the main floor in one corner is located the chief's office, operator's dressing room, washroom, shower, etc.

The first units installed at Brawley were three 1,100 hp. Hamilton, three cylinder, two stroke cycle, single acting Diesel engines, each driving a 750 kw., 4,150 v., 60 cycle, three phase Allis-Chalmers generator. These engines are equipped with attached scavenging blowers of the Roots-Connersville type.

The three six-cylinder, two stroke cycle, single acting Diesel engines, directly connected to 2,188 kva. General Electric generators, are each rated at 2,300 hp. at 240 rpm. Scavenging blowers for these three engines are of the Allis-Chalmers single stage, single inlet type and are directly driven by 250 hp. motors. They have a speed of 3,550 rpm., a capacity of 11,000 cfm., each at 3.2 lbs. per square inch.

The two new units installed last fall consist of Hamilton, 10 cylinder, two stroke cycle, single acting Diesel engines, direct-connected to 3,610 kva. Allis-Chalmers generators. Each engine is rated at 4,070 hp. at 240 rpm. In the case of all eight engines, the mean piston speed is 1,100 ft. per minute, the brake mean effec-

tive pressure 63.22 lbs. per square inch, the compression pressure 500 lbs. per square inch and the maximum post ignition pressure is 750 lbs. per square inch.

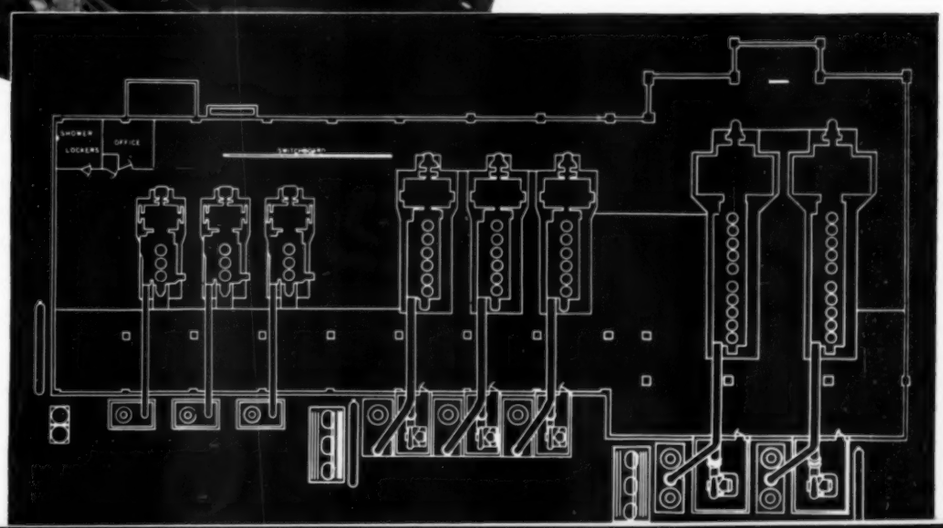
All eight engines are equipped with American Bosch fuel injection systems, isochronous governors, and Kinney attached lube oil pumps. All pistons are oil-cooled through telescopic type tubes and all cylinders are equipped with starting air valves. The cylinder lubricators are Manzel for all engines and are mounted on the side of the engine and driven from the main fuel pump camshaft which runs the full length of each engine.

The engine cooling system is the closed type, using treated water for jacket cooling and raw, untreated water on the cooling tower side. Braun heat exchangers are used on both the lube oil and jacket water for the 3- and 6-cylinder units, but Condenser Service & Engineering Co. exchangers are used with the two new 10-cylinder units. All of the Condenser Service & Engineering Co. coolers are placed outside of the building on concrete piers. The lube oil coolers for the 10-cylinder engines have each a capacity sufficient to cool 600 gallons of oil a minute from 144°F. to 120°F., using 450 gallons a minute with inlet temperature of 95°F. and outlet temperature of 110°F. Each jacket water cooler for the two new engines has a capacity sufficient to cool 900 gallons of soft water a minute from 150°F. to 135°F., using 900 gallons of raw water a minute with an inlet temperature of 95°F. and an outlet temperature of 110°F.

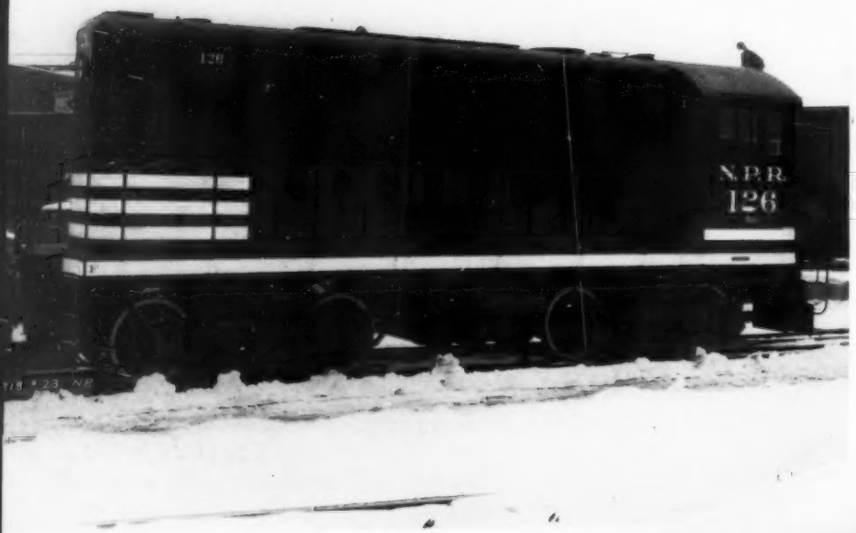
Due to the excessive temperatures and humidity conditions which occur during the months of June, July, and August, it was found that the atmospheric type of cooling tower installed with the first three engines was not entirely practical. Records show that a dry bulb temperature of 119°F., a wet bulb temperature of 90°F., and an air movement of one mile per hour frequently occur at the same time. Due to these conditions the atmospheric tower installed with the first three engines failed to completely handle the heavy load placed on it during the peak periods. To make this condition worse, the air-conditioning load in the valley is also at its peak due to the temperature and humidity conditions, and thus combine to make cooling most difficult. For these reasons, it was found necessary to go to forced draft cooling. When the 6-cylinder units were installed, a Marley, three compartment, forced draft type of cooling tower was put into service and a duplicate unit of the Marley type was installed when the two new 10-cylinder engines went into service.

The soft and raw water, lube oil, and fuel oil pumps, the centrifuge air compressor and other auxiliaries are located in the basement with water and oil headers running lengthwise of the building. Purolator lube oil filters for all engines are mounted in the basement on concrete slabs. They are the duplex type.

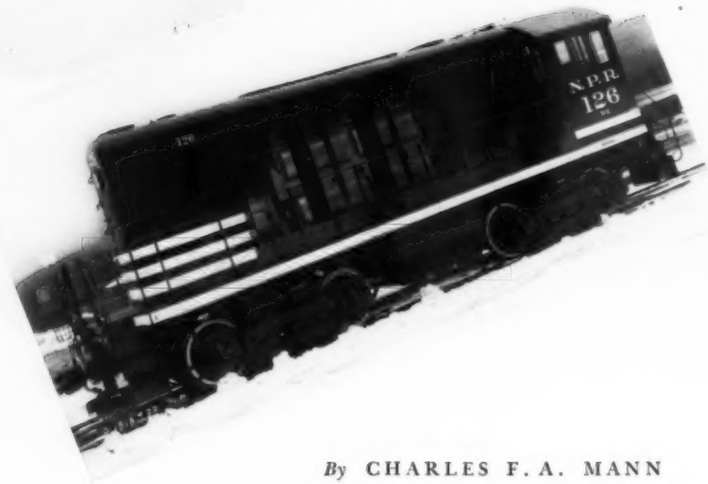
*Two views of the operating side of the new ten-cylinder Hamilton Diesel engines recently installed in the Brawley Diesel Plant.*




*Plan view of the Brawley Diesel Plant as it now is, showing the relative location of the three sets of engines, all, however, of the same cylinder size — 21½" x 27½".*




*Two views of the American Locomotive 660 hp. Diesel switcher, three of which were ordered by the Northern Pacific Railway.*




# NORTHERN PACIFIC *Diesel Switchers*

*By* CHARLES F. A. MANN

EARLY in 1939, waterfronters along Seattle's Alaskan Way were pleasantly surprised to note a sleek, quick-moving Diesel switching locomotive busily engaged in shoving heavy strings of boxcars around the busy waterfront transfer tracks, incident to terminal movements in the congested freight wharfage area. In the past, Seattle's waterfront has been a noisy, grimy scene, what with the Milwaukee, Northern Pacific, Union Pacific, Pacific Coast and Great Northern Railways all doing their switching and transfer movements with smoky, noisy, steam switch engines of generally ancient vintage.

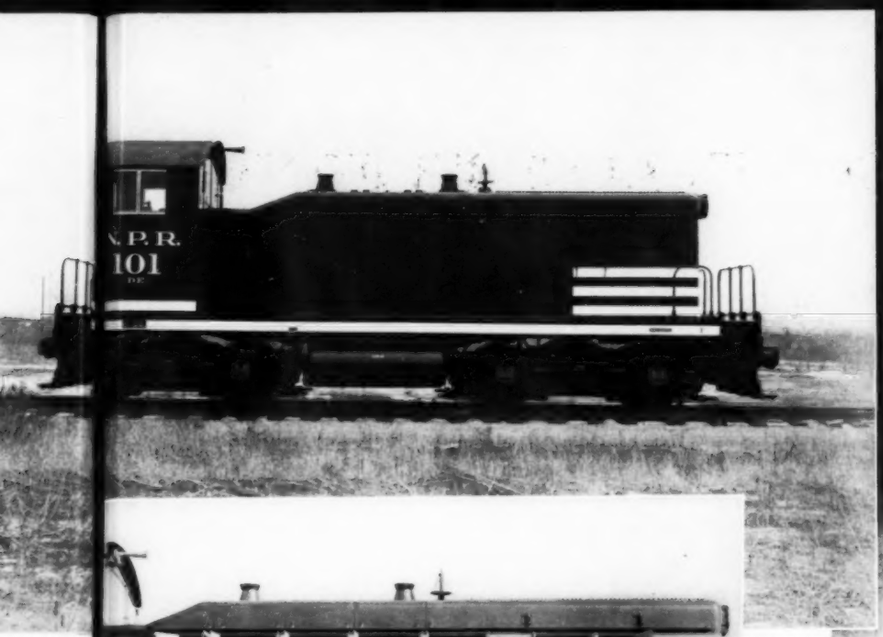
The appearance of a Diesel switching locomotive on the Seattle waterfront, bearing the label NORTHERN PACIFIC, startled old timers because it marked the appearance of the first Diesel locomotive ever operated in the Northwest region and it also marked the entrance of one of the largest coal-owning railway systems in the United States into Diesel operation.

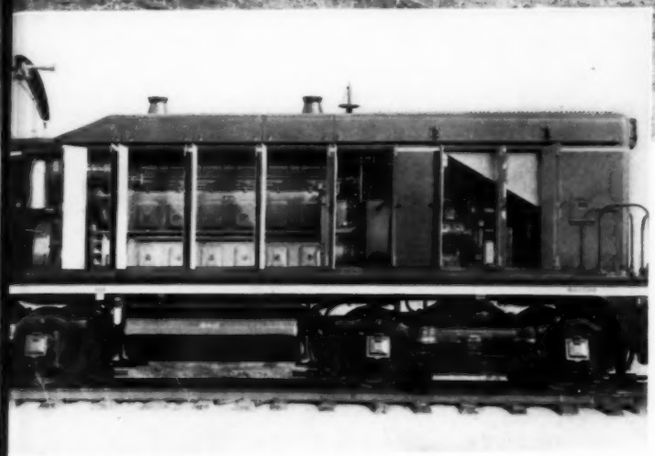
Since that time, the Northern Pacific EMC Diesel switching locomotive No. 100 has been performing with remarkable success, and it appears that Seattle's long dirty waterfront will get another wholesale cleaning sometime in 1940. The Northern Pacific has ordered seven new Diesel switching locomotives from three manufacturers, to be divided between the Seattle, Tacoma, Spokane, and Northtown (St. Paul) yards. Two of the new switchers will be stationed in Seattle, two at Northtown and one each at Tacoma and Spokane, while two of the 1,000 horsepower switchers are as yet unassigned.

Perhaps no other railroad has gone so far with its development of economical steam power, nor is so lavishly endowed with low cost fuel. Obviously, when the Northern Pacific decided to turn to Diesels, it was the result of a "Show Me" testing period subject to the scrutiny of a Locomotive Department which could righteously claim the privilege of being the world's greatest "doubting-Thomases" on the subject of Diesel Motive power.

Of significance to the American Diesel locotive industry and to the Railroads in general is the fact that one of America's strongholds of steam motive power has, after coldly studying the operating statistics, discovered that not even a plentiful supply of low cost, good steam coal can offset the advantages of Diesel switchers in busy terminal zones where a high percentage of availability and economical, clean operation are the major requirements for this class of service.

Meanwhile, the Northern Pacific during December announced a continued interest in Diesels, in spite of the fact that it had just put into operation its latest A2 and Z6 steam power clear through to Seattle, Tacoma and Portland, by ordering seven Diesel switching locomotives. The natural inference is that, for terminal




*Three 1000 hp. Diesel switching locomotives of the type illustrated in the two views above are being furnished to Northern Pacific by Electro-Motive Corporation.*


*The 1000 hp. Baldwin Locomotive switcher powered with a De La Vergne Diesel engine (shown above) is similar to the 660 hp. unit to be supplied on Northern Pacific's order.*

switching. Diesels are superior and, for main line haul, the low-grade coal-fired power is better for the Northern Pacific. As this article is written, however, it is well to observe that General Motors Corporation has just completed a gruelling test of its mystery 5,400 horsepower freight locomotive on the Northern Pacific Railway between Yakima and East Auburn over the tough Cascade Mountain crossing. The Northern Pacific and Santa Fe were thusly honored in these important tests.

*Author's note:* The above is supposedly a secret, but reports out in the West indicate the G. M. Diesel freight locomotive hauled, without a helper, a 2,500 ton freight train over the N. P. line from Yakima to East Auburn,—40 cars over 2.2 per cent grade *with no pusher.* Ordinarily 2 steam Mallet freight engines are needed to haul this type of train.

The conclusions are inevitable—the Northern Pacific Railway system offers the most important testing ground for Diesel locomotives in the United States today, because of the peculiar economic and geographic setup of this pioneer Western line.

The order for switchers placed last December includes three-1000 horsepower units from General Motors, three-660 horsepower units from American Locomotive Co. and one-660 horsepower unit from the Baldwin Locomotive works. The EMC units are each powered with the regular 2-cycle, V-type EMC Diesel, with their new EMC generators and EMC traction motors. The American Locomotive Co. units have 6 cylinder, 4-cycle Mc Intosh & Seymour Diesels and General Electric generators and traction motors, while the Baldwin units have 6 cylinder, 4 cycle De La Vergne VO Diesels and Westinghouse generators and traction motors. Both the Baldwin and Alco units weigh 199,000 lbs. each and develop 40-45 miles per hour each, while the larger EMC units weigh 250,000 lbs. each and develop a top speed of 60 miles per hour (permissible in case of necessity).

# THE "WOHLMANIZED" E. LESTER JONES

*By* CHAS. F. A. MANN

FOR the account of the United States Coast & Geodetic Survey, the Astoria Marine Construction Company of Astoria, Oregon, has turned out an unusual, very husky, and very durable new vessel christened *E. Lester Jones*, after one of the now-deceased stalwarts of the Geodetic Survey.

Beside being one of the first Diesel vessels of the Service to incorporate yacht-like lines and lightweight high speed Diesel drive, it is also one of the very first wooden vessels ever built in the United States of America that has been completely treated with Wohlman Salts—"Wohlmanized"—to make it virtually rot-proof and good for at least twenty years without a single replacement of a plank or stringer. Her plans were adapted and laid down by H. C. Hanson of Seattle, noted builder and designer of unusual wooden vessels up and down the Pacific Coast, and she was built under the direction of Joseph M. Dyer, of the Astoria Marine Construction Co.

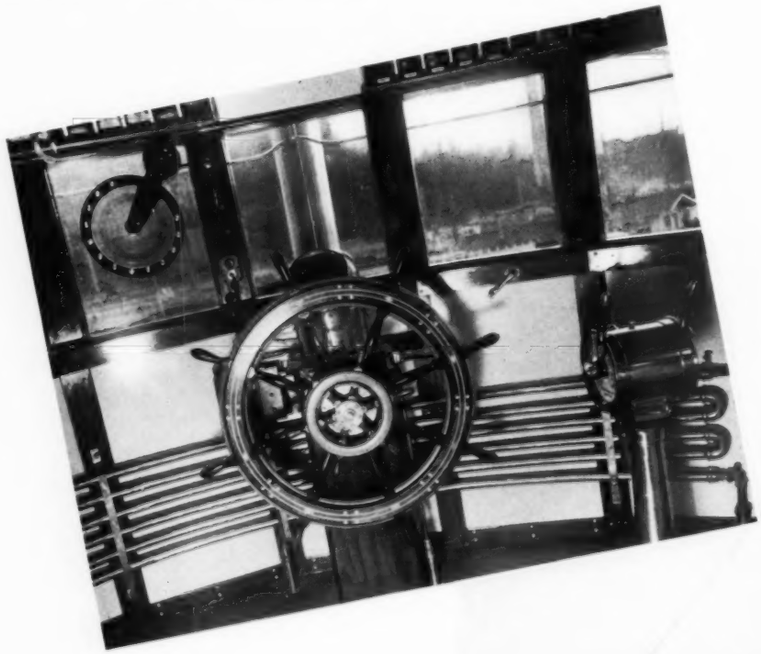
The entire hull was fabricated to a close fit, with all bolt-holes drilled and all parts planed to fit, then shipped knocked-down in sections, which were numbered and coded, to the treating plant up the Columbia River. There, through two soaking baths, the Wohlman salts were pressure-forced into the wood. After several days of curing, a chemical reaction with the cellulose in the wood renders the wood insoluble in either fresh or salt water. The treated sections were shipped down to Astoria and assembled again to form the fitted hull. The treatment added about $4,000 to the cost of the vessel.

The *E. Lester Jones* is 88 ft. long overall x 21 ft. beam x 11.10 ft. depth and 8 ft. draft. The machinery space contains two 150 to 165 hp. Type EN 6 cylinder Cooper-Bessemer Diesel engines, delivering their rated power at 500-550 RPM. The engines are cooled by Ross heat exchangers through closed fresh water circuits. An indication of the performance may be gleaned by the fact that on her 227 mile shakedown cruise from Astoria to Seattle, her base, she averaged 10½ knots and turned up nearly 550 RPM.

The engine foundation departs from the customary practice, and is a stiff, welded steel box girder, running clear to the engine room bulkheads, which are also of steel. This gives a stiff, less-bulky foundation of unusual rigidity.

Her electrical system consists of two Model HWS-28 Reiner Diesel marine auxiliary units, each of which consists of a four cylinder Waukesha-Hesselman oil engine driving the following auxiliaries by means of clutch arrangements: a 7½ kw., 120 volt D.C. generator; a 90 gpm. bilge, fire and general service pump; a 30 gpm. lubricating oil transfer pump; and a 20 cu. ft., two-stage air compressor. All of these auxiliaries are built into one compact unit by John Reiner & Co. Inc. A Red Flash oil fired heating boiler (American Radiator) is fitted and a Robinson Mfg. Co. steel front switchboard with a De-Ion circuit breaker, in addition to a Carrier Freon refrigerating pump, are all fitted in the engine room. At each of the four corners of the engine room are 1,000 gallon steel fuel tanks, with a 21 x 84 in. air bottle stop, giving balance to the tank load and a 4,000 gallon fuel capacity. Over the aft tanks is a Crane fresh water system.

Each main engine drives a Coolidge, 3-bladed bronze propeller, of 44 inches in diameter and 29 in. pitch, through bronze tailshafts. Monel metal fastenings are liberally used throughout the hull and machinery layout. A Goodrich Rubber stern bearing is fitted on both shafts. The rudder is electrically operated by a Photo Electric Pilot made by the Photo Electric Pilot Corp. This unit provides motor driven power steering or automatic mechanical steering in addition to regular hand operation.



*View in pilot house showing small steering wheel which controls the Photo-Electric Pilot power steering unit.*

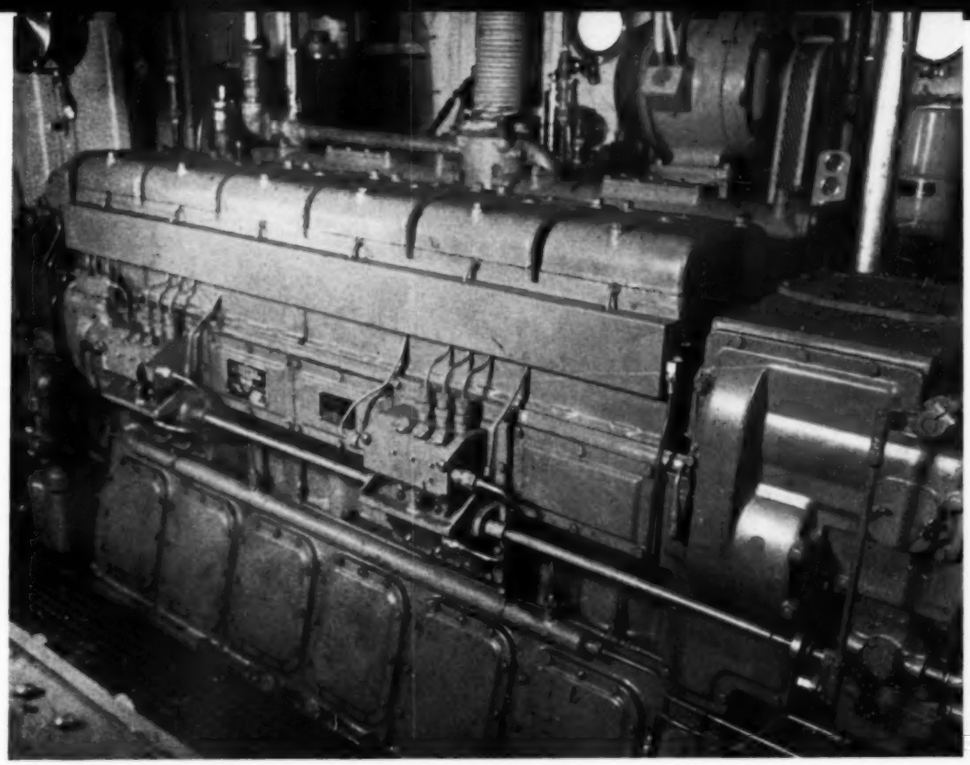
*The "E. Lester Jones" on trials. Second from the left on the forward deck is Joseph M. Dyer, President of Astoria Marine Construction Co., builders.* →

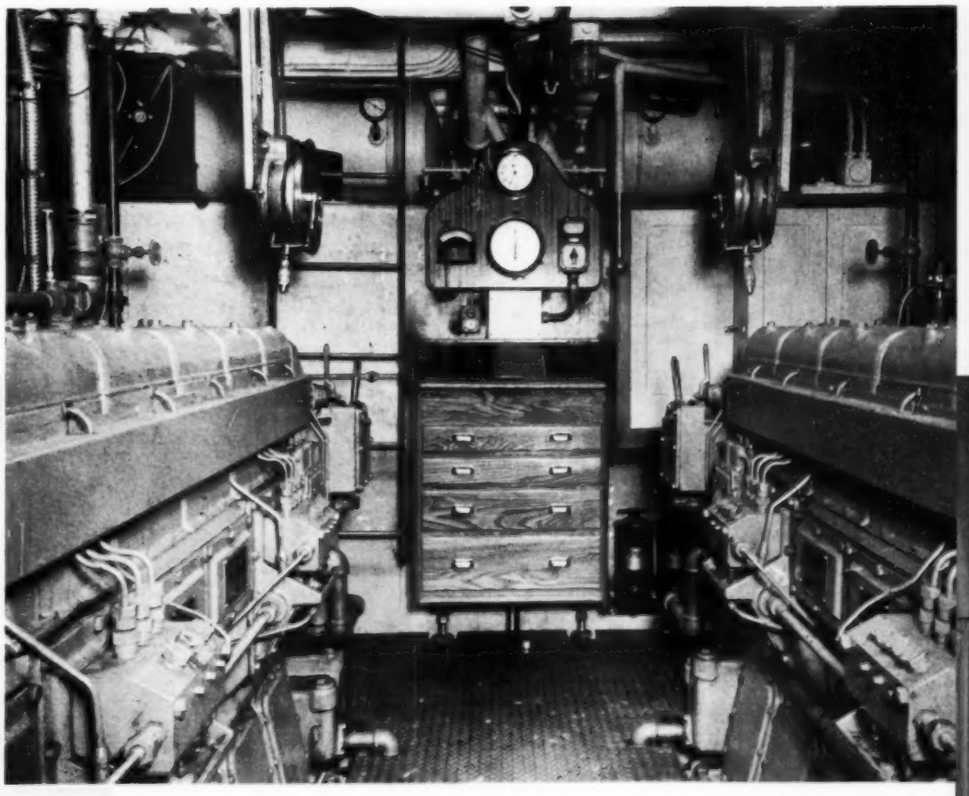
After the engine room, below, is a ward room, with three berths for officers, desk, dining tables and toilet and shower, in addition to ample locker space. A three bottle LUX CO2 fire set is fitted, and an 800 gallon water tank and two 125-gallon lube oil tanks are located under the floor of this space. Under the Lazarette at the stern is a five ton cargo space.

Forward on the main deck is a Markay wildcat and windlass, driven by a 7½ hp. motor, with 75 fathoms of ACCO link chain and a 750 lb. anchor. A hand sounding machine is also located here. A thousand feet of ⅞ wire rope is also carried, with another 750 lb. anchor.

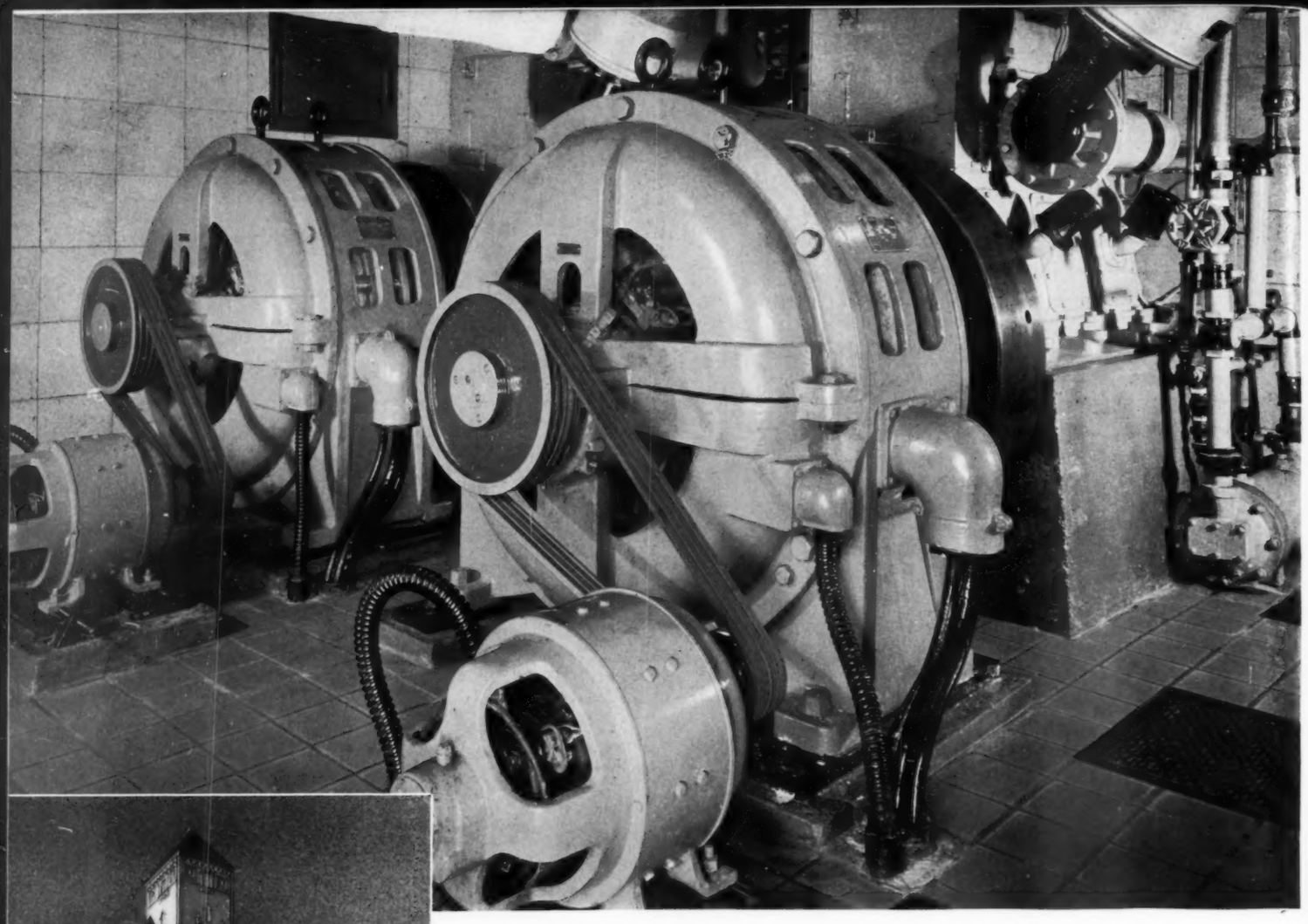
The raised wheelhouse carries numerous pieces of special sounding apparatus, a RCA code radio sending and receiving set, Bludworth direction finder and sounding machines. Aft of the pilot house is a crew's head, with lavatories, showers and lockers. The crews' mess and galley follow. A Valjean oil-fired range and Monel metal-lined work spaces, sinks and large ice box are items of equipment. A dry storage and a cold storage locker are fitted aft of the galley. The deckhouse is of wood with steel bulkheads and Johns-Manville Marinite panelling. Kearfott windows are fitted. Two 14 ft. lifeboats are carried on swing davits atop the deckhouse, as well as a 400 candlepower Sperry searchlight.

The *E. Lester Jones* is designed for long stretches of inshore work, charting the wild Alaska coast, and as a running mate for the new 200 ft. *Explorer* now completing in Seattle.





*Top—One of the twin Cooper-Bessemer 150-hp. propulsion Diesels. Next above—View showing both main Diesel engine and control stations. Note DeLuxe fuel oil filters against bulkhead lower right.*



*Two Superior Diesels and Elliott generators mounted on a single Korfund spring base for vibration isolation at Twenty Park Ave. Note Burgess intake filters and silencers.*

*Recently completed, this nineteen-store apartment building in the quiet Murray Hill section of New York receives all its light and power current from a Diesel electric generating plant in the basement.*

# TWENTY PARK AVENUE

*By* WILBUR W. YOUNG

"MODERN" is the word for this nineteen-story apartment building in quiet Murray Hill, New York. From the sound- and vibration-isolated Diesel engine room in the basement to the duplex penthouse, Twenty Park Avenue embodies the best in modern construction and equipment. The owners, Twenty-eight Park Avenue Corporation, entrusted the general contract for design, construction, and equipment to Diesel Electric Company, Inc., which, based on favorable experience in the past, selected a Diesel-electric generating plant as the sole source of energy for light and power throughout the building.

The electric load, over and above lighting, consists of two elevator motors, an all-electric laundry, including washer, extractor and drier for

*The Cole Electric switchboard with Western Union and Diesel-electric clocks which are kept in parallel by close frequency regulation.*

the tenants' use, and an air-conditioning plant employing, beside the circulating fan motor, a 20-ton Baker freon compressor with electric motor drive. The air-conditioning plant handles the first floor which is given over to doctors' apartments. In addition to summer air conditioning, the same equipment supplies circulating air of controlled humidity during the winter months. The daily electrical demand is averaging 925 kwh. with the building 92 per cent occupied.

One story below street level the Diesel-electric generating plant performs twenty-four hours a day while the tenants, without knowing the source, enjoy uninterrupted light and power service. This is due to complete isolation of the engines and generators on a single Korfund Vibro-Isolator base and Johns-Manville acoustic tile on the engine room walls and ceiling.

The engines are two Superior, 3-cylinder, 4-cycle, 9 in. bore, 12 in. stroke Diesels rated 135 hp. at 600 rpm. Two Elliott 80 kw. alternators are direct-connected and the Elliott 5 kw. exciters are V-belted from a step-up pulley on the generator shaft extension driving them at 1,200 rpm. Mounted on the engines are Purolator lube and fuel oil filters. Alnor flush type exhaust pyrometers and U. S. lube oil and air gauges are carried on the engine instrument panels. The governors are Woodward U. G. hydraulic type. Penn Electric pressure switches on the lube oil line and temperature switches of the same make on the jacket water system are connected in the alarm circuits.

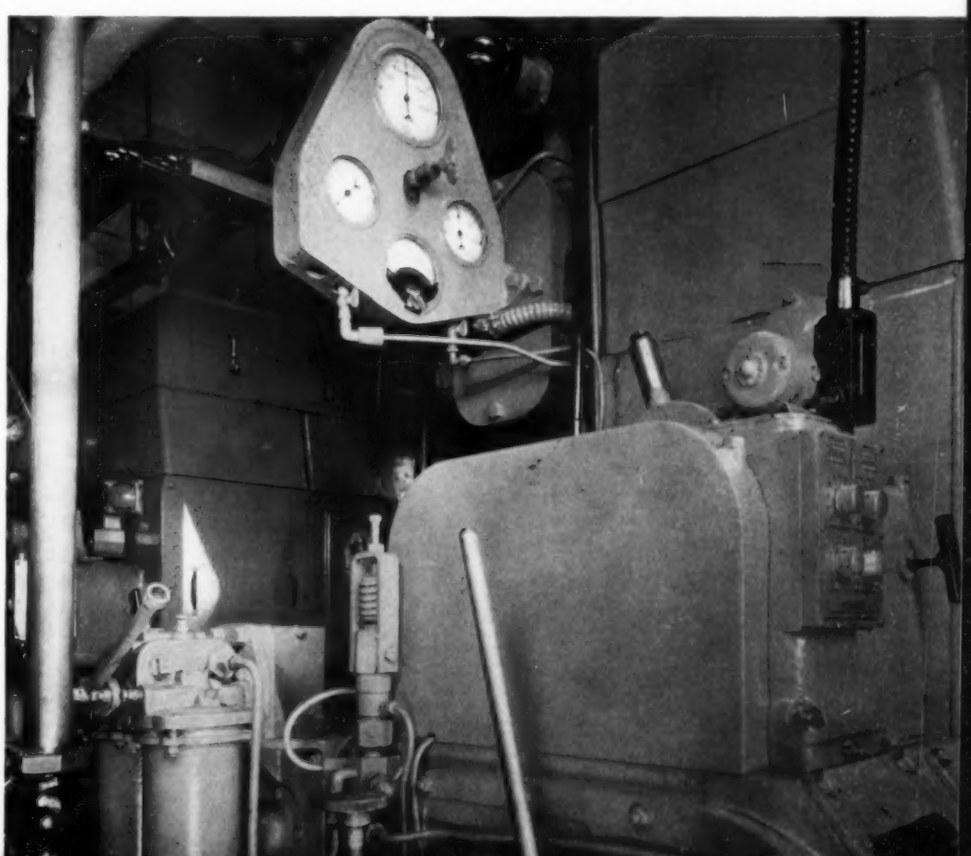
Every detail of equipment needed to render this plant entirely self-sufficient has been incorporated. All pumps are installed in duplicate; two Roper rotary transfer pumps bring the fuel oil from an 1,800 gallon storage tank installed in a concrete vault adjacent to the engine room to the two 10-gallon day tanks. A Pneumercator mercury column tank gauge with interpolation chart gives the exact account of fuel in storage. Daily readings of this gauge are entered in the log and are taken as an accurate record of fuel consumption. Compressed air for starting the engines is supplied by a motor-driven Curtis compressor. Another compressor of the same make, with a Wisconsin gasoline engine, is installed to meet emergencies.

Two Burgess snubbers in tandem are installed in each engine exhaust line. The heavily lagged exhaust lines and all overhead piping are carried on Korfund spring hangers which relieve the piping of vibration strains and effectively isolate the floor above from vibration.

The switchboard, supplied by Cole Electric Manufacturing Company, consists of two generator control panels and a totalizing panel. The control panels carry Ward Leonard field rheostats and Roller Smith voltmeters and ammeters. The totalizing panel carries Roller Smith light and power voltmeters, synchroscope frequency meter and Westinghouse watthour meter. A close check on frequency regulation is afforded by comparison of the Western Union clock and the Diesel-electric clock both mounted on the switchboard. Distribution of the load on the two engines is accomplished electrically. A nine cell Exide storage battery is maintained for emergency engine room lighting.

Operating data and comparative savings over utility costs are not yet available on this new plant. The Diesel Electric Company, however, predicates its Diesel installations on ample experience which justifies complete confidence in Diesel economy and independence of utility standby.

*View of the control end of the engine showing Woodward governor, Purolator fuel oil filter, and Alnor pyrometer on the gauge board.*




*Unique: a privately-owned Diesel generating plant in a show-case!*

# DIESEL—OUT IN FRONT!

*By* WILL H. FULLERTON

EXPOSED to full view of thousands of motorists on one of Long Island's busiest thorofares is the Diesel electric generating plant recently installed by Peet and Powers, Inc., for the Southern State Grill. Novel, to say the least, is the idea of placing the power plant in a show-case right out in front of the establishment which it serves—but the virtue of the idea is evident from the great number of persons who stop for a closer look.

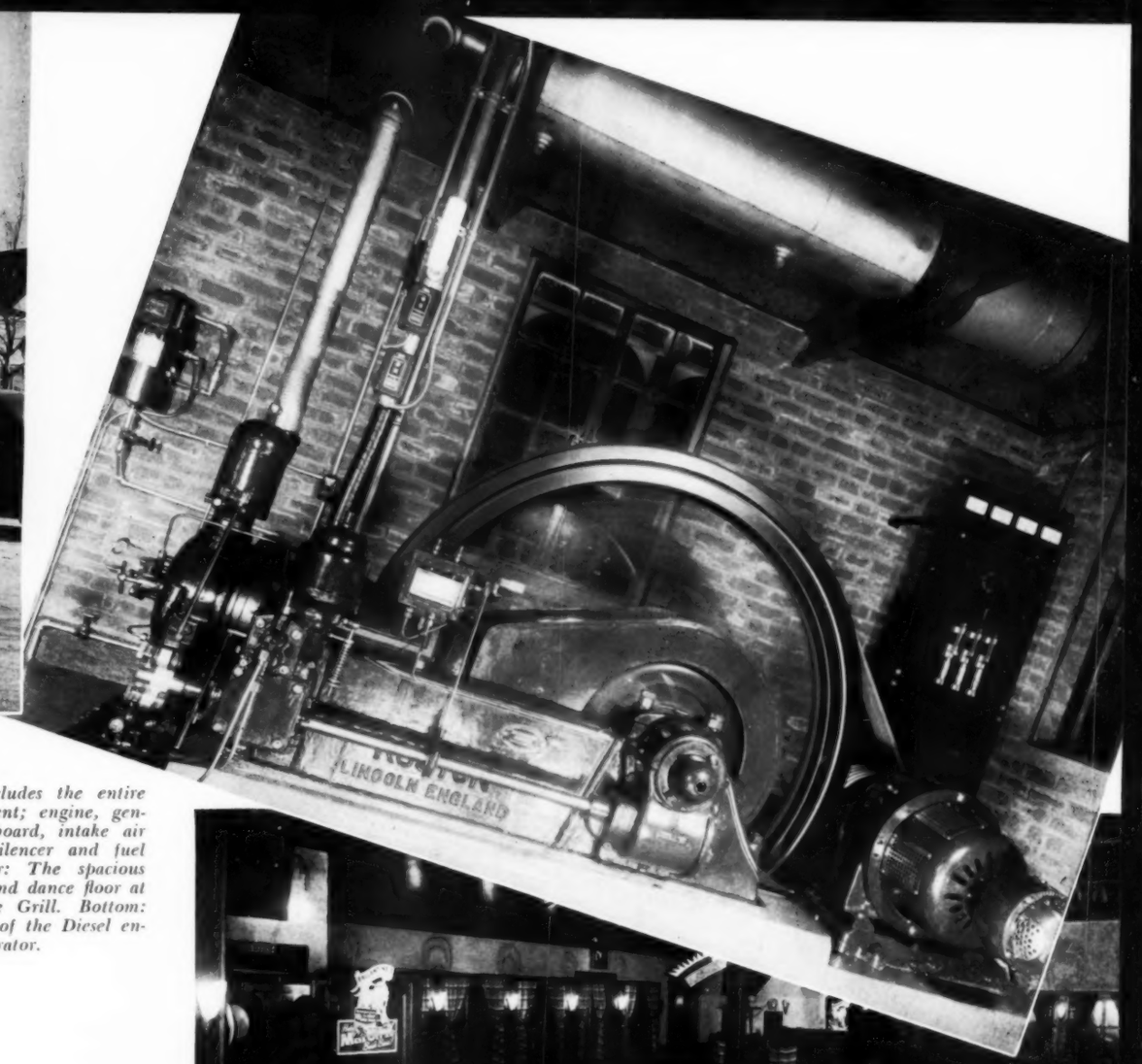
This engine room was especially constructed with the two sides, facing the intersection of Springfield and Linden Boulevards in St. Albans, Long Island, fitted with large glass windows. It is only natural that this installation should prove to be such an attraction. Brilliant lighting, plus the motion of the engine flywheel, command attention. Those who stop are rewarded with a close look at a Diesel-electric generating plant in action within a setting noteworthy for its tasteful color scheme.

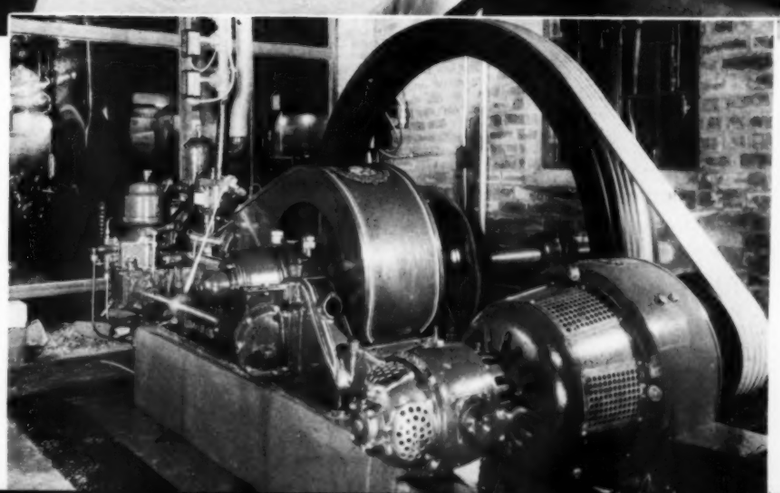
The engine is a Ruston horizontal, heavy duty type, single cylinder, 7½ in. bore, 14½ in. stroke, Diesel rated 20/22 hp. at 360 rpm. The generator is a Marble-Card 13.5 kw., 3-phase, 4-wire alternator with outboard exciter operated at 1,800 rpm. through a Gates V-belt drive from the engine flywheel.

Neatness and simplicity mark the entire treatment of this small private plant. Since it operates twenty-four hours of the day, it is only necessary to start the engine after periodic inspection shutdowns. Infrequent starting is easily accomplished by hand cranking. Intake air is taken from above the engine through an Air Maze oil bath cleaner and Maxim silencer. Cooling is effected by a Kramer unit heater arranged to heat the engine room in winter and to exhaust through the ventilator at the top of the building in summer. Operation of the cooling unit is controlled by a Minneapolis Honeywell thermostatic switch set to high and low temperature limits. A similar switch actuates an alarm in the event of excess jacket water temperature.

A single panel Seaboard Electric switchboard carries Simpson meters, rheostat, main switch and a Burlington voltage regulator. A Teesdale automatic transfer pump supplies fuel oil to the engine from the 550 gallon underground storage tank. Texas "Ursa" lube oil is supplied to the cylinder and bearings from a force feed lubricator which is fitted with a built-in reservoir.

Due to the prominence of this plant, considerable thought was given to the interior finish, and the result is a pleasing color combination. The cement floor is painted maroon with the trench covers finished in contrasting black. The ceiling is covered with gray Thermax. All piping is finished in aluminum and the engine bright green with polished chromium trim.

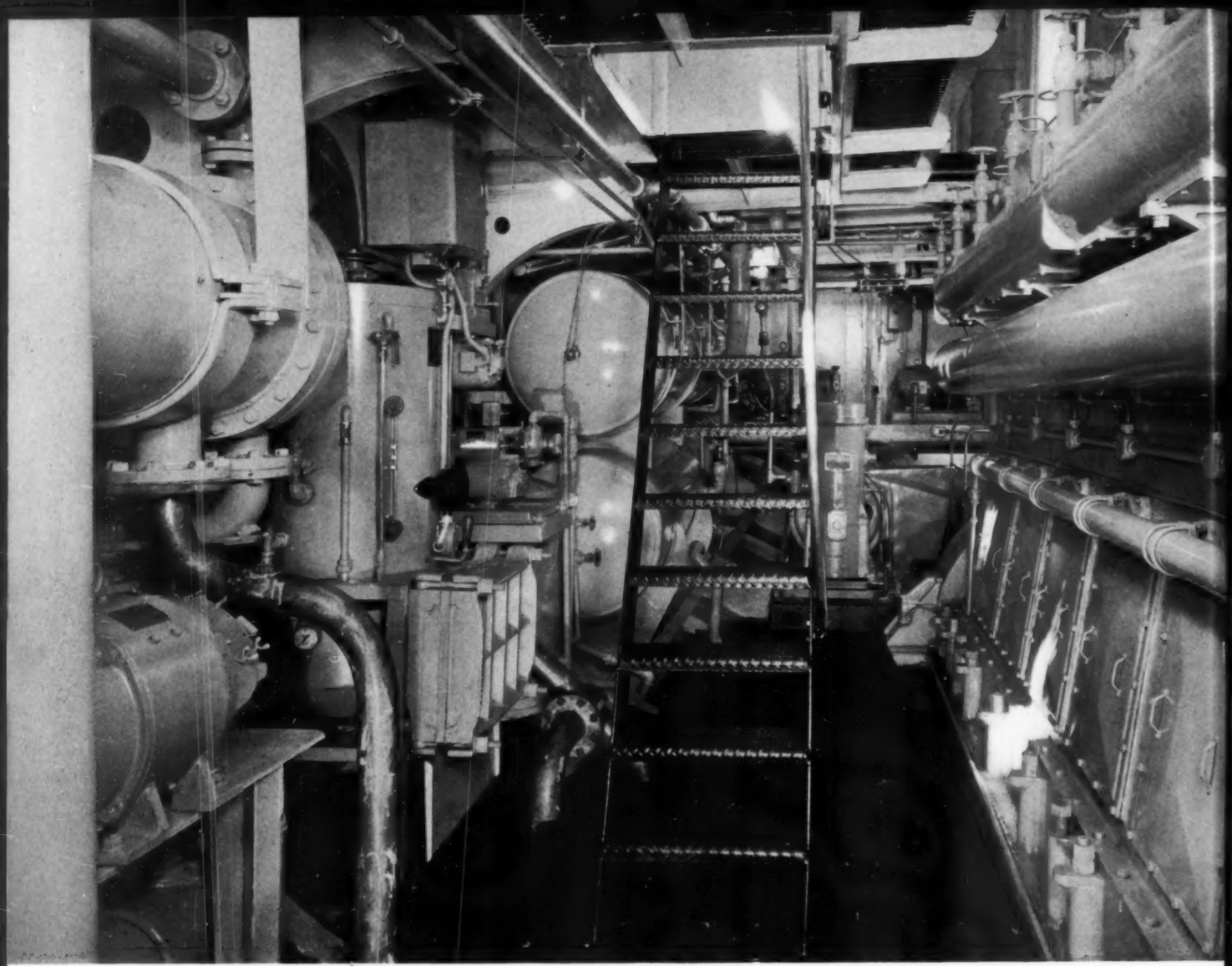



*Top view includes the entire plant equipment; engine, generator, switchboard, intake air cleaner and silencer and fuel pump. Center: The spacious dining room and dance floor at Southern State Grill. Bottom: Another view of the Diesel engine and generator.*

It is evident that the management of the popular Southern State Grill is proud of the power plant—and justly so, for aside from being an attraction, the Diesel generating plant is making money at the rate of $110 per month. Utility current cost averaged $125 based on the minimum of lighting possible. Operating cost of the Diesel plant is $15 per month with unrestricted use of the installed lighting. This load together with the power load from kitchen and ventilating equipment now totals only 9 kw. Accordingly some 4 kw. capacity is available in the plant for additional lighting and electrical equipment. Utility connection is maintained for emergency lighting only at a minimum charge of $1 per month.

It is conservatively estimated that hundreds of people who see this unique Diesel plant will not only be attracted to patronize the Southern State Grill but will be prompted to investigate the possibilities of Diesel-electric generation for their requirements.



*Engine room view looking aft; main Superior Diesel on the right; Milwaukee Oil Refiner, left; Worthington compressor and Electro dynamic generator, center.*

# DIESEL TUG "RUSSELL 20"

*By* DWIGHT ROBISON

ANOTHER modern all-welded steel hull Diesel-engined tug was delivered by Liberty Dry Dock, Inc., March 28 to Russell Bros. Towing Co., operator for Newtown Creek Towing Company, owner. Over at Liberty Dry Dock they say the demand for these up-to-date, economical tugboats is such that they no sooner get one off the ways than the keel for another is laid.

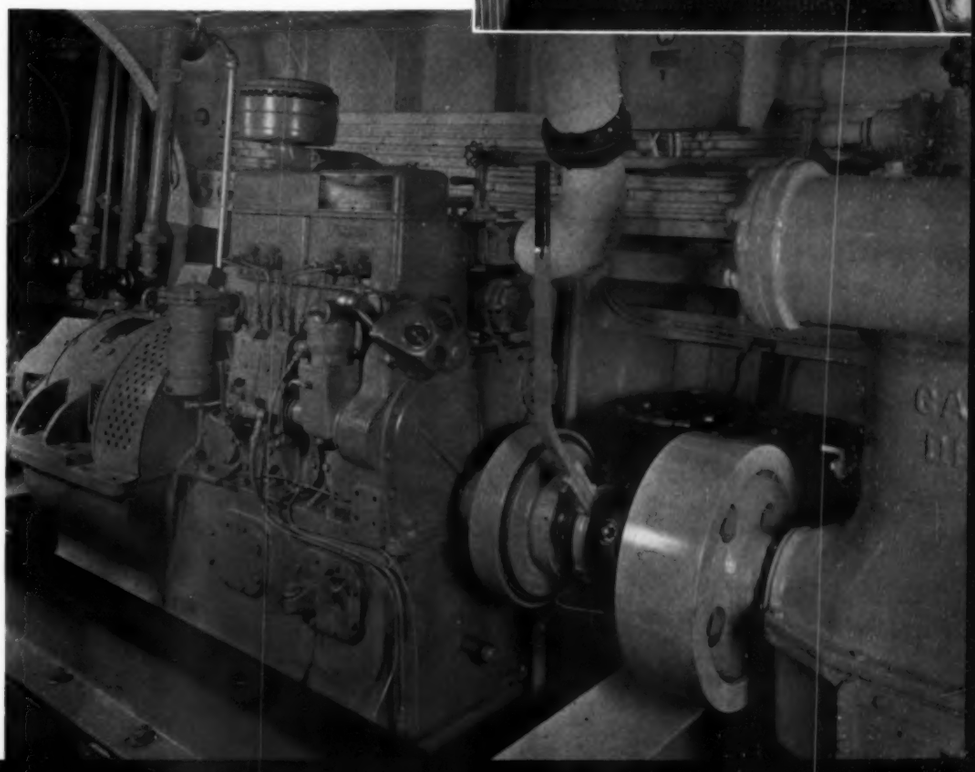
So the *Russell 20* joins the famous Russell fleet well equipped to maintain, if not to advance, the high standard of service set by this progressive organization. Classed under the American Bureau of Shipping for coastwise and inland service, the *Russell 20* has a length of 87 ft. 6 in., beam 22 ft., and depth 13 ft. While many Diesel tugs have preceded her, she is the first of the Russell fleet to be powered with Superior Diesels.

Her main engine is an 8-cylinder, 14½ in. bore, 18 in. stroke, 4-cycle, 690 hp., 300 rpm. direct-reversing Superior Diesel. Complete enclosures for all working parts of this engine render it relatively quiet in operation and trim in appearance. A departure from usual practice in marine applications is noted in the use of a small stationary type flywheel at the propeller end of the engine. The extension shaft to the Kingsbury thrust bearing is bolted to the flywheel. The main engine gauge board carries an Alnor, eight-point exhaust pyrometer, U. S. gauge air and oil pressure gauges, and a Weston tachometer. The same instruments, excepting the pyrometer, are duplicated at the remote control station in the upper engine room. A large Nugent filter is fitted to the lube oil system while Purolator filters handle the fuel oil. The closed fresh water cooling system has a Ross heat exchanger installed with a Goulds circulating pump direct connected to a Westinghouse motor. A Ross cooler is also fitted

*The "Russell 20" is ready for service after successful trials. View along main engine looking forward.*

Every modern convenience for the comfort of the crew and for efficiency of operation is included in the outfitting of the *Russell 20*. The pilot house, staterooms, and galley, trimmed with mahogany and teakwood, are entirely insulated with rock wool and are heated by a Crane oil burning steam plant. Hot and cold running water is available in the staterooms and galley. Navigation equipment includes a two-way Western Electric radio telephone. Her towing equipment is an American Engineering 12 hp. electric capstan and the electric hydraulic steering gear is of the same make. Fuel and lube oil storage are sufficient for one month of service under load.

*This view shows the 4-cylinder Superior auxiliary Diesel, Gardner-Denver air compressor, and Electro dynamic generator.*



to the lube oil system. A large section of Penflex air jacketed flexible tubing connects the engine exhaust to the Maxim spark arrester silencer mounted in the stack. An Electro Dynamic reversible shaft 12 kw. generator and Worthington compressor are V-belted to the propeller shaft.

Her auxiliary unit is powered with a Superior 4-cylinder, 20 hp. Diesel, fitted with American Bosch injection and Purolator fuel filter, driving a Gardner-Denver air compressor forward, and an Electro Dynamic 20 kw. generator and Watrous service pump in line aft. A Diamond D Dodge clutch is fitted between the generator and pump. Edison 110 volt storage batteries float on the line. A Yale one-ton chain hoist serves the main engine. Lube oil reclamation is handled in a Milwaukee Oil Refiner. The Smith Meeker switchboard is fitted with Weston instruments.

*The right half of the Centerville plant was altered to house the last Diesel installed in 1937. Note Maxim silencer.*

# CENTERVILLE, MARYLAND

*By* WILBUR W. YOUNG

MUNICIPAL ownership of the light plant in Centerville, Maryland, dates back to 1912. The history of this successful operation is highlighted by consistent profits through the years which were directed toward general municipal improvement and frequent modernization of the light plant. The latest development in the growth of the Centerville Light Plant was the installation, in 1937, of a Chicago Pneumatic, 8-cylinder, 800 hp. Diesel and a Westinghouse 750 kw. generator.

Since steam was the motive power in this plant when municipal ownership started twenty-eight years ago, it is natural that steam equipment was retained considerably beyond the time when more favorable Diesel operating economy was an established fact. In 1931, the entire steam equipment, including a turbo-generator, a uniflow-generator, two 150 hp. fire-tube and 240 hp. water-tube boilers, were replaced by two Chicago-Pneumatic Diesel engines direct connected to Westinghouse generators. The two Diesels are 6-cylinder, 14 in. bore, 20 in. stroke, 4-cycle, 450 hp. at 257 rpm. and the generators are rated at 300 kw. each.

By 1937, the combination of good management and Diesel economy had produced profits sufficient to pay off the cost of the equipment installed in 1931 and constant extension of lines had increased the load to the point where additional generating equipment was required. It was in the fall of 1937 that the Chicago Pneumatic, 800 hp. Diesel with direct-connected Westinghouse 750 kw. generator was installed. The plant as now set up can handle its peak load on a combination of any two engines, leaving one engine available for service at all times.

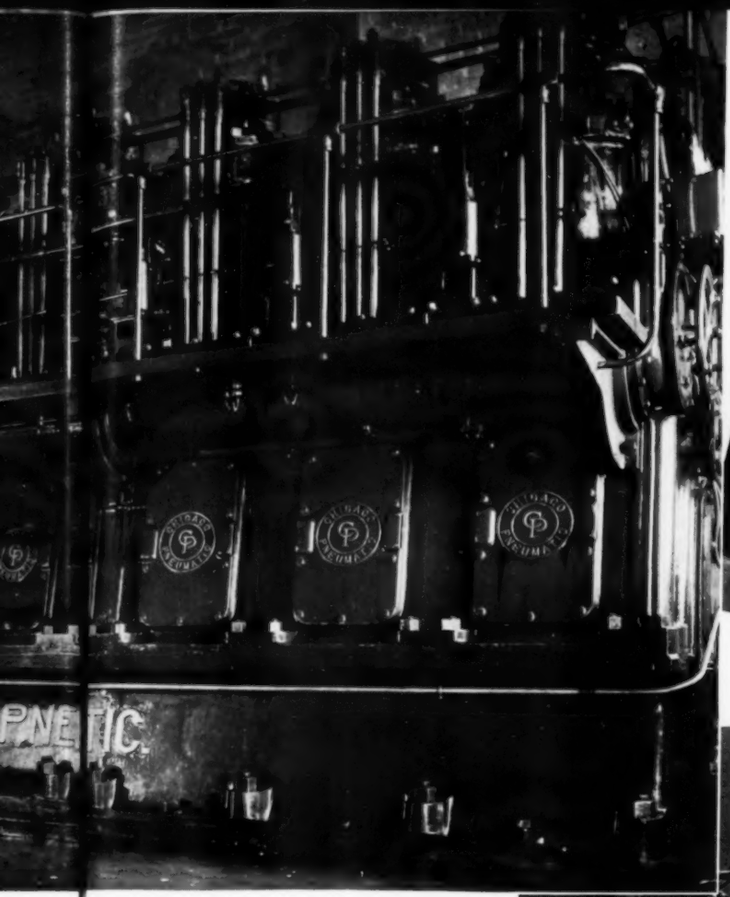
Interesting innovations in accessories attached to and installed with the newest Diesel include its Pickering 3700 class isochronous governor, American Bosch injection system, American Hammered piston rings, Alnor pyrometer, Maxim exhaust silencer, Nugent fuel oil filter, Groco lube oil cooler, and Viking alarm system on jacket water temperature and lube oil pressure. The latter system is also arranged to give alarm in the event of excess exhaust temperature. All three Diesels are equipped with Manzel force feed lubricators and Motoco jacket water thermometers. DeLaval, horizontal type lube oil reclaimers were installed with each of the 6-cylinder Diesels, while a Goulds Hydroil handles the lube oil for the 8-cylinder Diesel. The lube oil used in the two smaller engines is Socony-Vacuum D.T.E. and in the big engine Gulf Parvis is used.

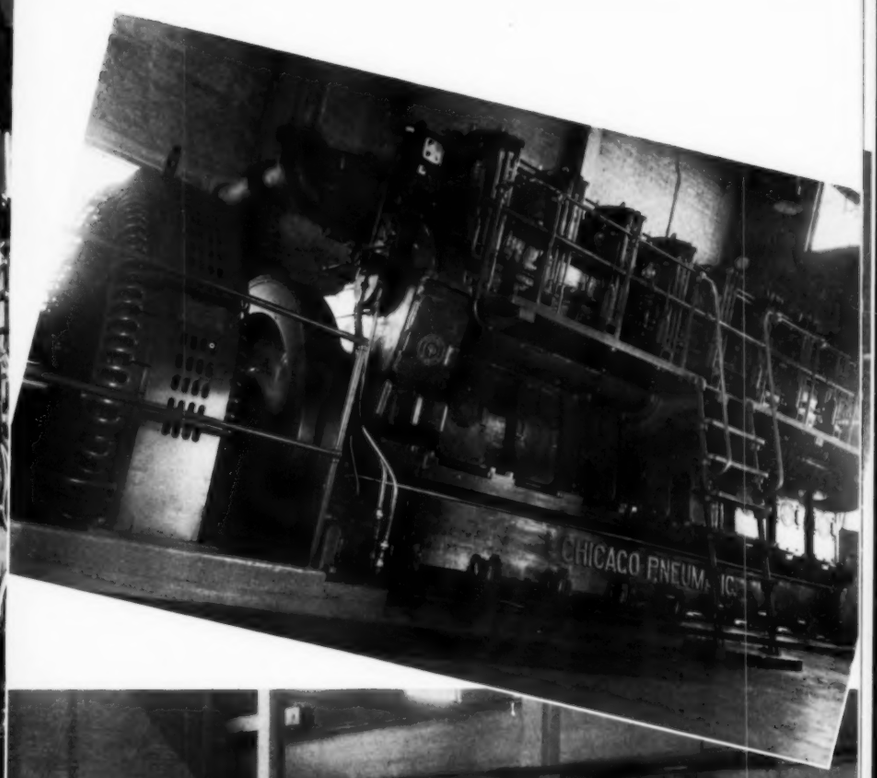
All generators, exciters and switchboards and instruments are Westinghouse, except the Allis Chalmers, Brown Bovari type voltage regulator.

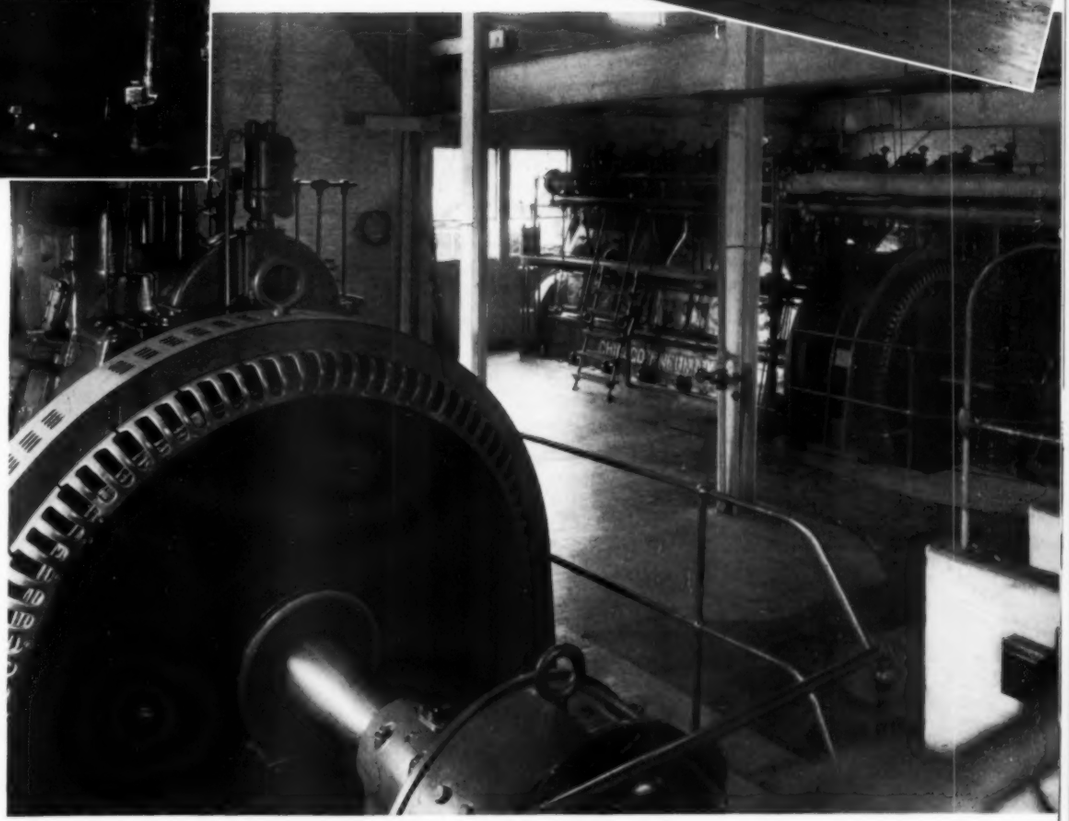
All three cooling systems are closed and receive make up water from the city mains. Two Goulds 750 gpm. centrifugal pumps direct-connected to Westinghouse 15 hp. motors circulate the jacket cooling water through a Marley coil which is mounted above the pond that formerly was the city reservoir. Water from the pond is pumped by two pumping equipments, the same as above, through a spray coil mounted above the jacket water coil. Spray water playing on the jacket water coil thus effects cooling by a combination of evaporation and convection.

Fuel oil flows by gravity from the two 12,000 gal. storage tanks, which are installed on high ground near the plant, directly to the 500 gal. day tanks on the 6-cylinder engines and the 280 gal. day tank on the 8-cylinder engine. A Shaw-Box 5-ton crane serves the two smaller engines and a Yale one-ton hoist is mounted over the large engine.

The Centerville Electric Plant serves three outside communities and, through the aggressive





*The two top views are of the last generating unit installed at Centerville, a Chicago Pneumatic eight cylinder, 800 hp. Diesel and Westinghouse 750 kw. generator. The gentleman is Mr. Paul R. Weldie, General Manager. Note Pickering isochronous governor above the flywheel. Right — General view, showing the two original Chicago Pneumatic Diesels in the background and the last installed unit in the immediate foreground.*

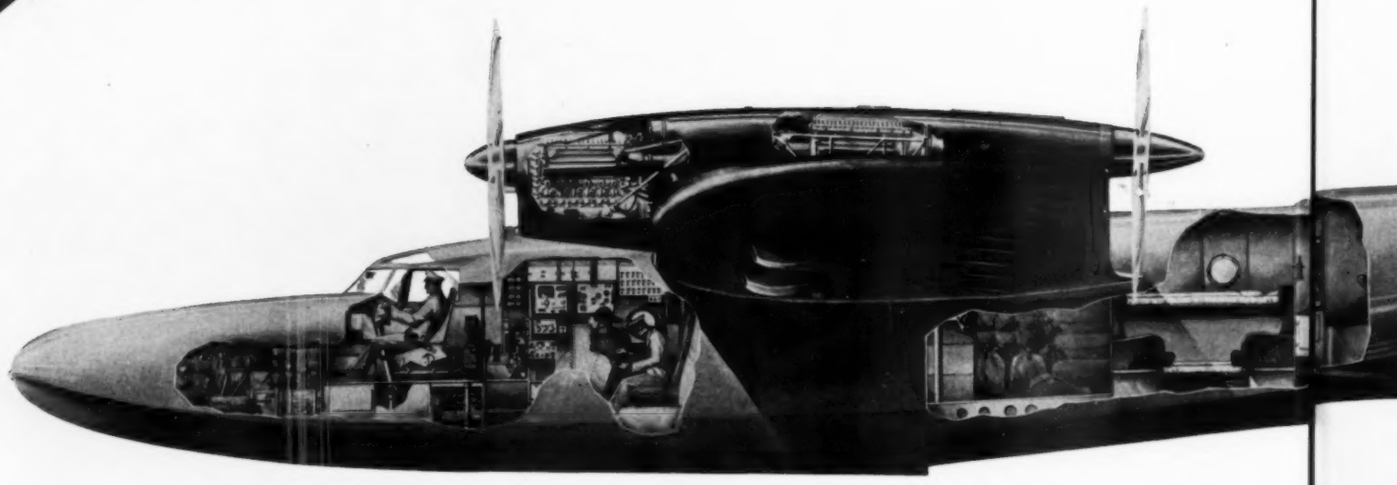
management of Mr. Paul Weldie, its rural lines have been extended to a total of 104 miles. The rate scale, given below, may easily account for a great deal of its expansion:

| | *Centerville* | | *Out of Town* |
|---|---|---|---|
| First | 15 KWH | $0.11 | $0.12 |
| Second | 15 KWH | 0.06 | 0.07 |
| All over | 30 KWH | 0.03 | 0.03 |

Minimum charge $1.25. Off peak water heating charge $0.01 per kwh with a $2.00 minimum charge. Power rate $0.025 per kwh metered on the primary side with $100 minimum charge. Centerville's municipal ball park draws large crowds to night games. This 230 kw. lighting load is carried on a flat $0.025 rate. The plant produced a gross of 1,585,800 kwh. in 1938 and a net operating revenue of $21,000 before depreciation.

Looking back we see a fine example of the advantages of municipal ownership and management of electric utility through twenty-eight years in Centerville and the ultimate point of departure between steam and Diesel operating economies. The Diesel plant, beside carrying the interest on a considerable bonded indebtedness carried over from the old steam plant, paid off the first two units in seven years and is paying for the last unit installed on the basis of a ten-year term.

DIESEL AVIATION



*Cut-away view of a four-engined Dornier Do 26 flying boat powered with 700 hp. Junkers Jumo 205-E Diesels. This type of airplane can fly non-stop between the United States and Europe*

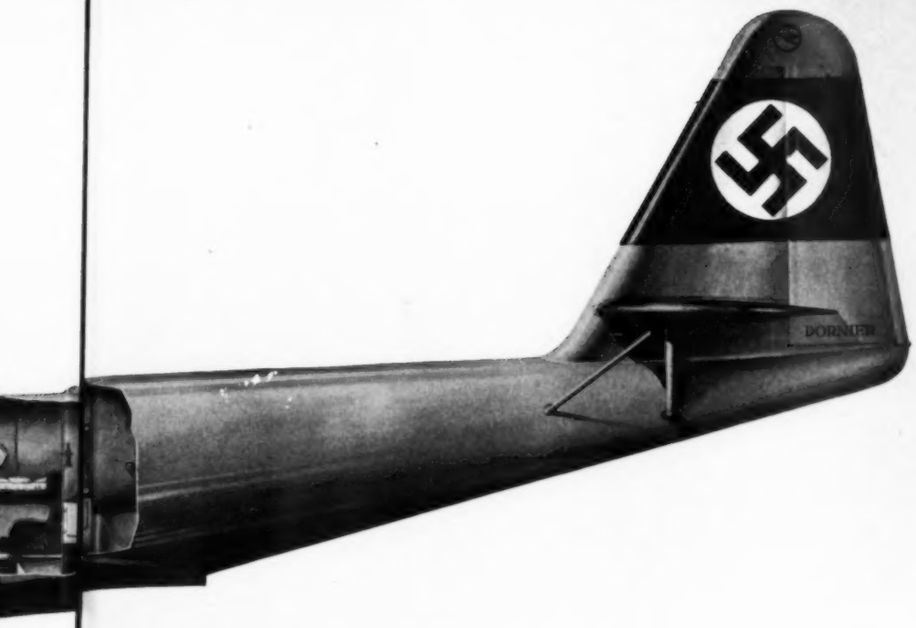
# TRANSATLANTIC AIRLINES NEED THE DIESEL

*By* PAUL H. WILKINSON

THE recent announcement that Pan American Airways is in the market for 50-passenger airliners with a payload capacity of 17,500 lb. and a flight range of 5,000 miles, focuses attention once more on the need of the Diesel for transatlantic airline operations. This type of airliner would require four 2,000 h.p. engines cruising at 60 per cent of their rated power output to give it a specified cruising speed of 300 m.p.h. Its flight range and cruising speed would enable it to fly non-stop over the 3,400-mile route between New York and Lisbon in approximately 13.3 hours' flying time.

*Loading Red Cross supplies on a Diesel-engined Dornier Do 26 flying boat*

If this new type of airliner were powered with Diesels, the latter would consume 1,680 lb. of fuel oil per hour compared with 2,064 lb. of gasoline which would be consumed each hour if it were powered with 90-octane gasoline engines. The fuel load required for the Diesel-engined airplane would weigh 26,880 lb., including 20 per cent fuel reserve, compared with 33,020 lb. of fuel for the gasoline-engined airplane. The Diesel-engined airplane would therefore have a payload capacity of 23,640 lb. compared with the 17,500 lb. payload specified for the gasoline-engined airplane.




The weight allowance for 50 passengers on an airliner of this type is approximately 12,500 lb. This would leave a weight allowance of 11,140 lb. for more profitable payload such as mail on the Diesel-engined airplane compared with a weight allowance of only 5,000 lb. for similar purposes on the gasoline-engined airplane, or a balance of 6,140 lb. in favor of the Diesel. Assuming that 5,000 lb. of this additional 6,140 lb. was devoted to airmail bringing in a revenue of $4.00 per lb., then the additional revenue which could be derived by the Diesel-engined airplane from this source would amount to $20,000 per flight *over and above* the revenue earned by both airliners from the specified payload of 17,500 lb. In the course of fifty flights representative of one year's operations, this additional revenue would amount to $1,000,000 which would pay for the cost of the Diesel-engined airplane.

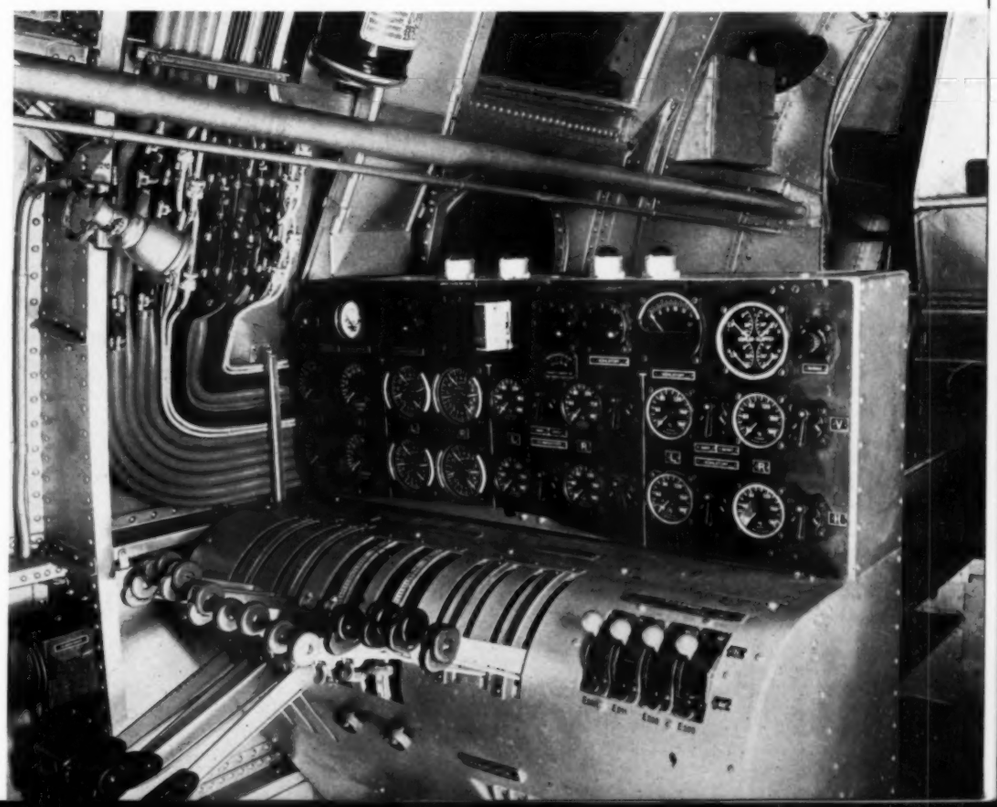
When one considers the past achievements of Pan American Airways on its transatlantic route between New York and Lisbon via the Azores, it is obvious that there is an urgent need for the Diesel for this type of service if it is to be operated on an all-the-year-round basis. Apart from delays due to mechanical troubles, the departure of Pan American Airways' gasoline-engined Boeing 314 Clipper flying boats has been frequently delayed during the past six months by bad weather conditions at the Azores. Numerous passengers have been stranded at Bermuda and at the Azores due to the excessive loads of gasoline which have had to be carried on these airliners. Interference with the mail by Great Britain has been invited by detouring them via Bermuda and on many occasions the mail has been delayed so long that it would have been quicker to have sent it on an ocean liner.

On April 16, it was announced by Pan American Airways that its *Atlantic Clipper* had established a new westbound record between Lisbon and New York. When this gasoline-engined airliner arrived at New York, however, it carried less than 5,000 lb. of mail and had left its five passengers at Lisbon and the Azores. Furthermore, its departure from Lisbon had been delayed for five days on account of bad weather at the Azores where it had to alight for refueling. The actual flying time of 24 hours and 21 minutes was a fine achievement — but the additional five days, which must be added to the flying time if it is to be considered as a scheduled flight, greatly detract from its value.

It is not difficult to calculate the performance of a Boeing 314 Clipper powered with Diesels instead of gasoline engines. Four 1,500 hp. Diesels cruising at 50 per cent of their rated power output would effect a saving of 4,380 lb. of fuel between New York and the Azores which could be utilized for additional payload. Alternatively, this saving in weight would enable the range of the airplane to be increased so that it could fly non-stop between New York and Lisbon carrying a payload of 6,880 lb.

The illustrations with this article depict a Dornier Do 26 flying boat powered with four 700 hp. Junkers Juno 205-E Diesels. This type of airplane has excellent long-range flight characteristics as was shown when one of them owned by Deutsche Lufthansa carried a load of Red Cross supplies from Travemünde on the Baltic coast, a distance of 6,645 miles, to Rio de Janeiro with stops at Lisbon and Bathurst en route. It will be seen that the engine controls and engine instruments are under the supervision of a flight engineer as on other four-engined aircraft. Diesel-engined mailplanes of this type catapulted on *regular schedule* would solve the problem of all-the-year-round airmail service between the United States and Europe.

*Engine Controls and Engine instrument panel on a Diesel-engined airplane.*



*The 44 year old tug "Columbia" repowered with a 400 hp. Atlas Diesel engine.*

# TUGS COLUMBIA AND LORRAINE

## *Diesel Engines Modernize 44 and 55 Year Old Vessels*

WHEN a ship passes the half-century mark, if, in fact, it ever reaches that age, it is reasonable to assume that any investment it may represent has been amortized and retirement is a matter of course. Certain vessels. however, provide the exceptions that prove the rule, and fortunate is the owner who secures one or more of these seemingly ageless craft. Two outstanding examples are the tugs *Lorraine* and *Columbia* of the Eastern Transportation Company, Baltimore, Maryland. The former was built in 1885 and the latter in 1896, and both are in active, profitable service with many years of earning power still ahead.

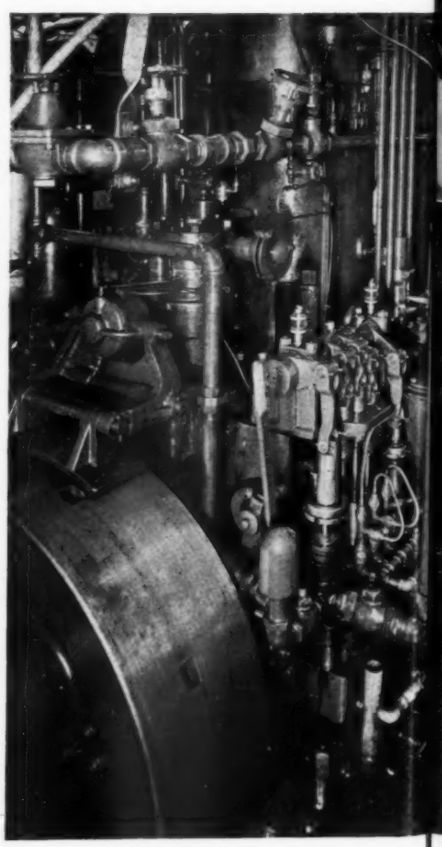
These tugs are of similar size and construction and their principal dimensions are as follows:

| | *Lorraine* | *Columbia* |
|---|---|---|
| Length | 82.7 ft. | 77.0 ft. |
| Beam | 19.0 ft. | 18.0 ft. |
| Depth | 9.2 ft. | 9.0 ft. |
| Gross tons | 88 | 84 |
| Net tons | 44 | 51 |
| Original steam power | 318 hp. | 270 hp. |

It became apparent to the owners in 1937 that both ships were increasingly uneconomical to operate due to high fuel and maintenance costs, which were unavoidable with machinery of that age, yet surveys indicated that new hulls were quite unnecessary.

Against the advantages of retaining the same type of power originally installed and with which the crews were familiar were the considerations of increased availability from greater cruising range without refueling, complete shutdown of main propulsion units during standby periods, and additional power with less weight offered by conversion to Diesels. Predominate practice on both coasts for vessels of this type and size favored the latter and an Atlas Diesel of 400 hp. was ordered from the Fleck Engineering Company of Baltimore. The contract for the yard work was awarded to the Baltimore Marine Repair Shops. Thirteen months later, similar conditions resulted in repowering the *Columbia* with a second 400 hp. Atlas Diesel.

In view of the fact that specifications for the *Lorraine* called for all-electric auxiliaries including steering gear, two 15 kw. Hill Diesel generating sets were installed in addition to the Atlas main propulsion unit. Hand-steering was retained on the *Columbia,* and auxiliaries were somewhat simplified so that it was possible to economize by fitting one Reiner unit consisting of a 10 hp. single cylinder, Stover Diesel, 5 kw. Fidelity generator, Quincy air compressor



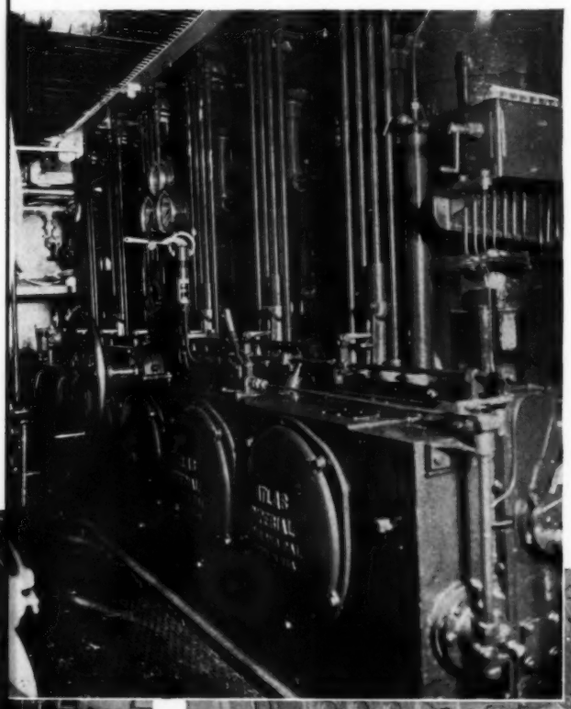
and a 4 in. centrifugal wrecking pump. This assembly is so arranged that the generator can be motorized to crank the Diesel, if preferred to handcranking.

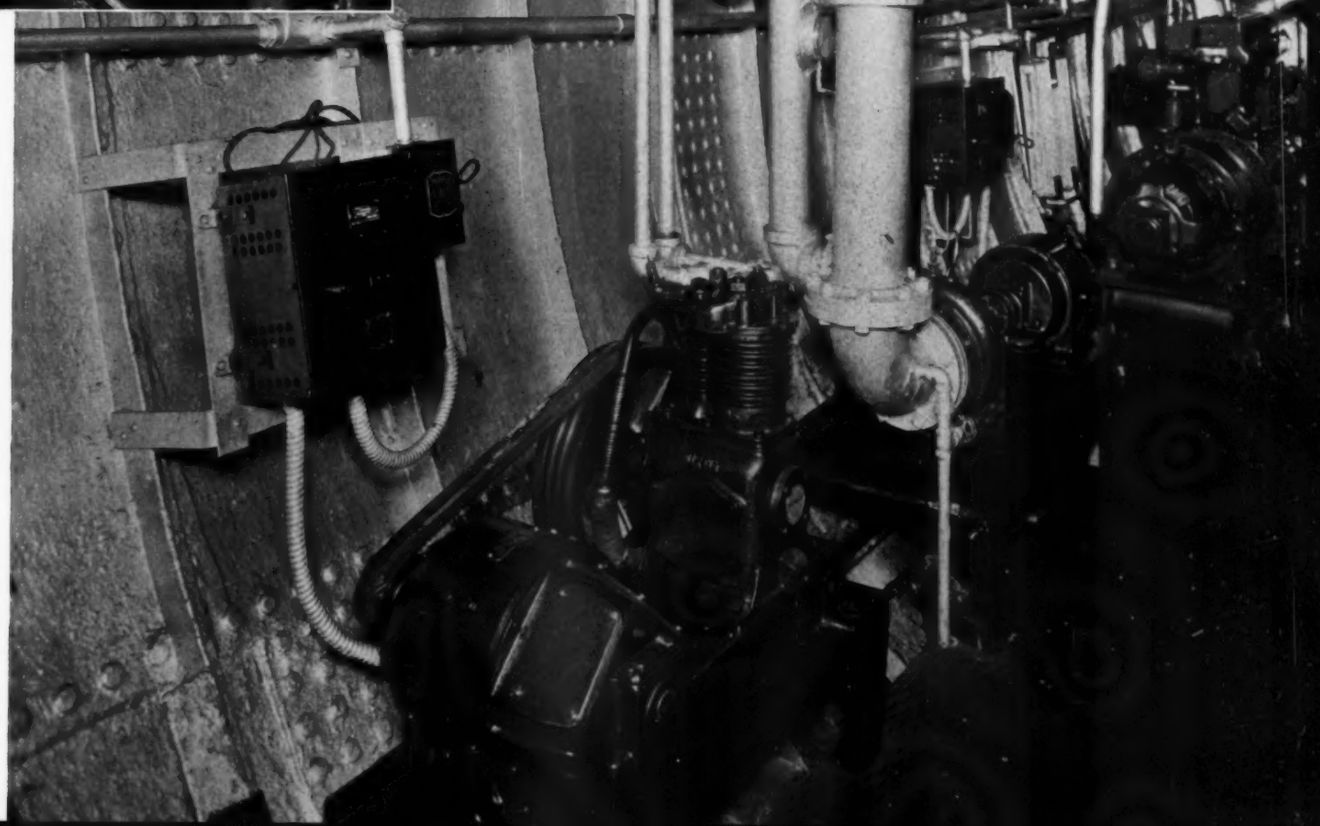
Each Hill Diesel generator set on the *Lorraine* is mounted on Korfund Steel spring Vibro-Isolators and has sufficient capacity to supply the motor-driven auxiliaries, which provides ample emergency reserve for the Curtis compressor, Goulds Hydroil and various pumps, all individually motor-driven. Other equipment common to both installations includes Alnor exhaust temperature pyrometers, Titan storage batteries, Maxim silencers, Pennflex exhaust piping, Harrison heat exchangers for closed cooling of main engines, Scaife starting-air tanks, Webb oil-burning galley ranges and Columbian Bronze propellers. In addition, the *Columbia* has a 3 kw. General Electric generator belt-driven from the tailshaft of the main engine, which supplies electrical power while under way.

The practical results of these conversions from steam to Diesel propulsion more than exceeded expectations of both owners and crews. With an average speed, running light, of 12 knots, the following tows, selected at random, have been handled: four sand scows, measuring 36 ft. by 115 ft. and drawing 8 feet of water, carrying 750 tons each on a 65 fathom hawser, from Dutch Gap to Norfolk (88 nautical miles) in 28 hours; six scows loaded as above under similar conditions and distance in 32 hours. The latter is considered a full load for the larger tug, *Lorraine,* which has towed the sea-going barge *Eugene Hooper,* drawing 12 feet loaded and made fast alongside, from Richmond to Norfolk (100 nautical miles) in 16½ hours.

Since no change was made in crew personnel at the time of conversion, the opinion of Captain McGuigan is also interesting. As a "dyed in the wool" steam man in command of the *Lorraine* he was as skeptical of his new Diesel as might be expected. With no steam to keep up during standby periods, he is, nevertheless, sure of full power at a moment's notice. Captain McGuigan's log shows a saving of 30 per cent in towing time since the conversion on the basis of the same tow, distance, and weather conditions.

Thus, modern marine Diesels have rejuvenated two more old but able ships which, like the 65 year old U.S.S. *Bear,* now at the South Pole, are into or approaching their second fifty years of profitable operation.





*Left — View of the control side of the 400 hp. Atlas Diesel in the 44 year old tug "Columbia." Below — Arranged along the port-side of the "Lorraine" engine room are the motor driven Curtis compressor, foreground, and Hill Diesel auxiliary generating set in the background. Extreme Left — Engine room view of the "Lorraine" after conversion from steam to Diesel drive.*

*Chief Engineer J. K. Johnson, and Gregory de Reyna of the Arabi Packing Co., Inc., depend on two Buckeye Diesels for continuous refrigeration of their meat stocks.*

# PACKING HOUSE DIESELS

*By* WARREN GLEASON

IN no industry is continuous power supply more necessary than in meat-packing. Here, power failure means more than idle line-shafting and non-producing machinery; here, a failure impairs the refrigerating system, the very essence of the packing business.

In Arabi, Louisiana, a suburb of New Orleans, the Arabi Packing Company has been in operation since June, 1921, and according to Mr. Gregory de Reyna, president and general manager, the firm still has the same directors and management as it had when it first started production. From the position attained by this firm, it follows that the management knows its business.

While steam was used for part of the plant's requirements, the larger portion of the needed power was drawn from the lines of the local power company. The Arabi Packing Company plant occupies five and one-half acres of ground, employs over one hundred workmen, and has facilities for processing 600 cattle and 200 hogs per day. Hence, it was a considerable power user. In addition to electricity used in the plant, the company also acted as distributor for current in the community; yet, in spite of price concessions for its own large consumption and the special rating earned by its distributing services, the net cost per kwh. averaged $.0183. To remedy that situation, Mr. de Reyna turned to Diesel.

About four years ago, the first Diesel installation was made, a Buckeye five-cylinder engine developing 187½ hp. at 400 rpm. For eighteen months this Diesel engine was operated twenty-four hours a day, the only shutdowns being a one-hour stop once a week for changing lubricating oil.

At the end of that period, the management having been sufficiently sold by such convincing performance, an additional Diesel of identical specifications was installed and the stand-by service from the power company was dispensed with entirely. Up to date, after four years of Diesel experience, the total repair expense of the complete installation has been less than twenty-five dollars, according to Mr. J. K. Johnson, chief engineer. The net cost of electricity is now less than ½c per kw., about one-fourth of previous power cost. The monthly savings more than cover the installment notes of the engines, and Mr. de Reyna states that after four years, an engine that has completely paid for itself is of more value to him than a pile of receipted power bills, particularly as this power plant appears conservatively to be good for twenty more years of similar service.

Both Diesels are direct-connected to 156 kva. Elliott generators, which are damper wound to permit parallel operation if necessary; also, Elliott 5 kw. DC exciters, V-belt driven, are used. 2,300 volt current is produced, stepped down by General Electric transformers to 220 volts for motors throughout the plant and 110 volts for lighting purposes.

One switchboard is used for both engines, and

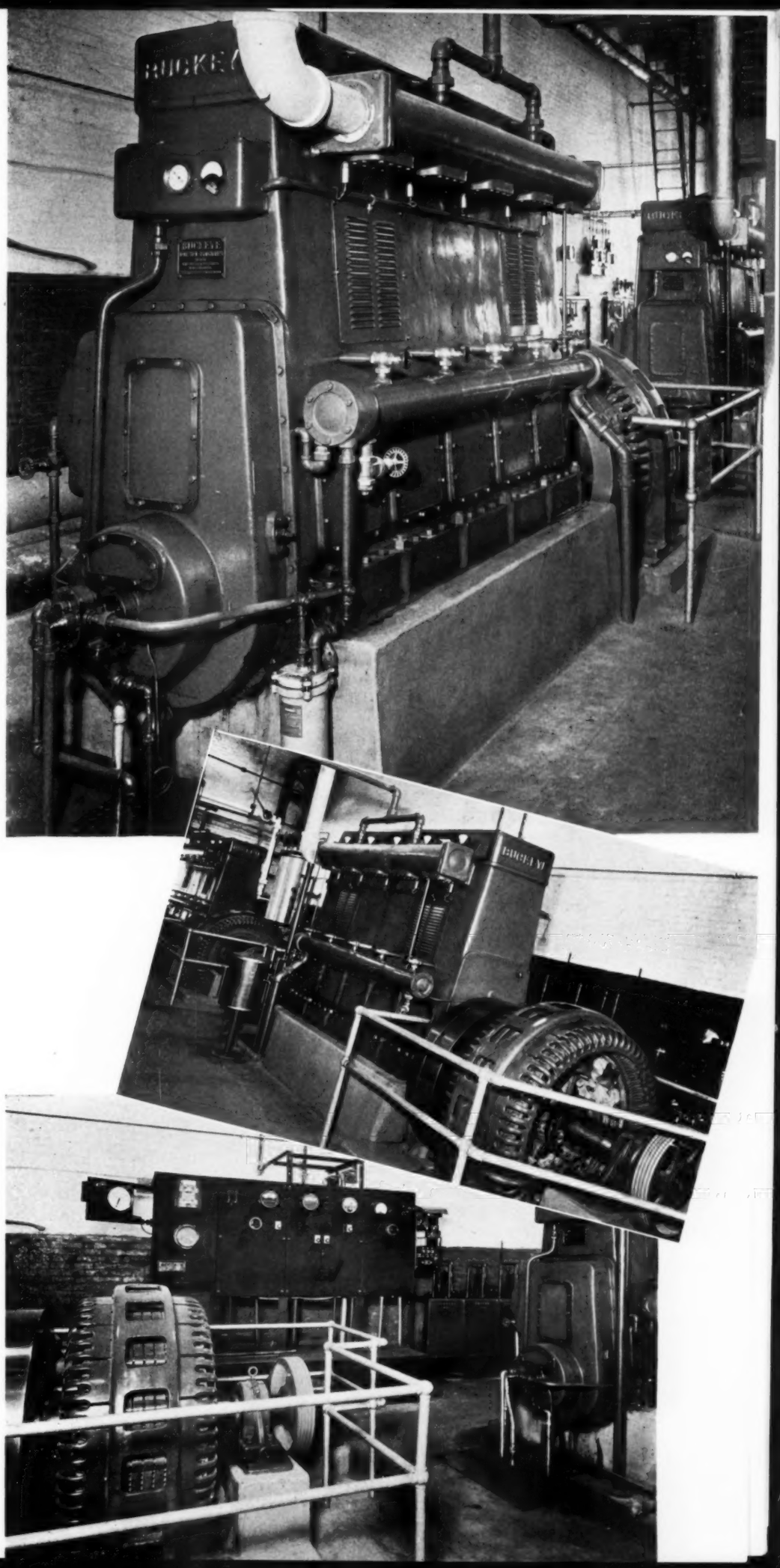
it is equipped with Wagner ammeter and voltmeter and a General Electric Type M-3 synchronism indicator. There is also a Simplex voltage regulator, about which Engineer Johnson is very enthusiastic for it maintains constant voltage despite load variations.

The following details will give some idea of these varying load requirements: Demanding current, there is a York 10 x 10 ammonia compressor, driven by a 2,300 volt Allis-Chalmers motor at 900 rpm. Beside this, there are twenty-five motors throughout the plant, driving different units. These motors, some of which are General Electric, some Fairbanks-Morse, some Allis-Chalmers, ranging in size from 3 to 50 hp., operate such equipment as driers, cookers, tripe-washing machines, crackling expellors, silent cutters, meat mixers and so on. Altogether, there is a total horsepower of 360 in these small motors alone, obviously not all used at the same time, and the current demand is subject to sudden fluctuation. Beside plant machinery, there are pumps for the water system; a 40 hp. motor handles the supply from a deep well, and there is a 25 hp. motor on 24 hr. per day service pumping water from the Mississippi River, near the levee on which the factory is located. This river water is used for cooling ammonia condensers and the service here must be unfailing.

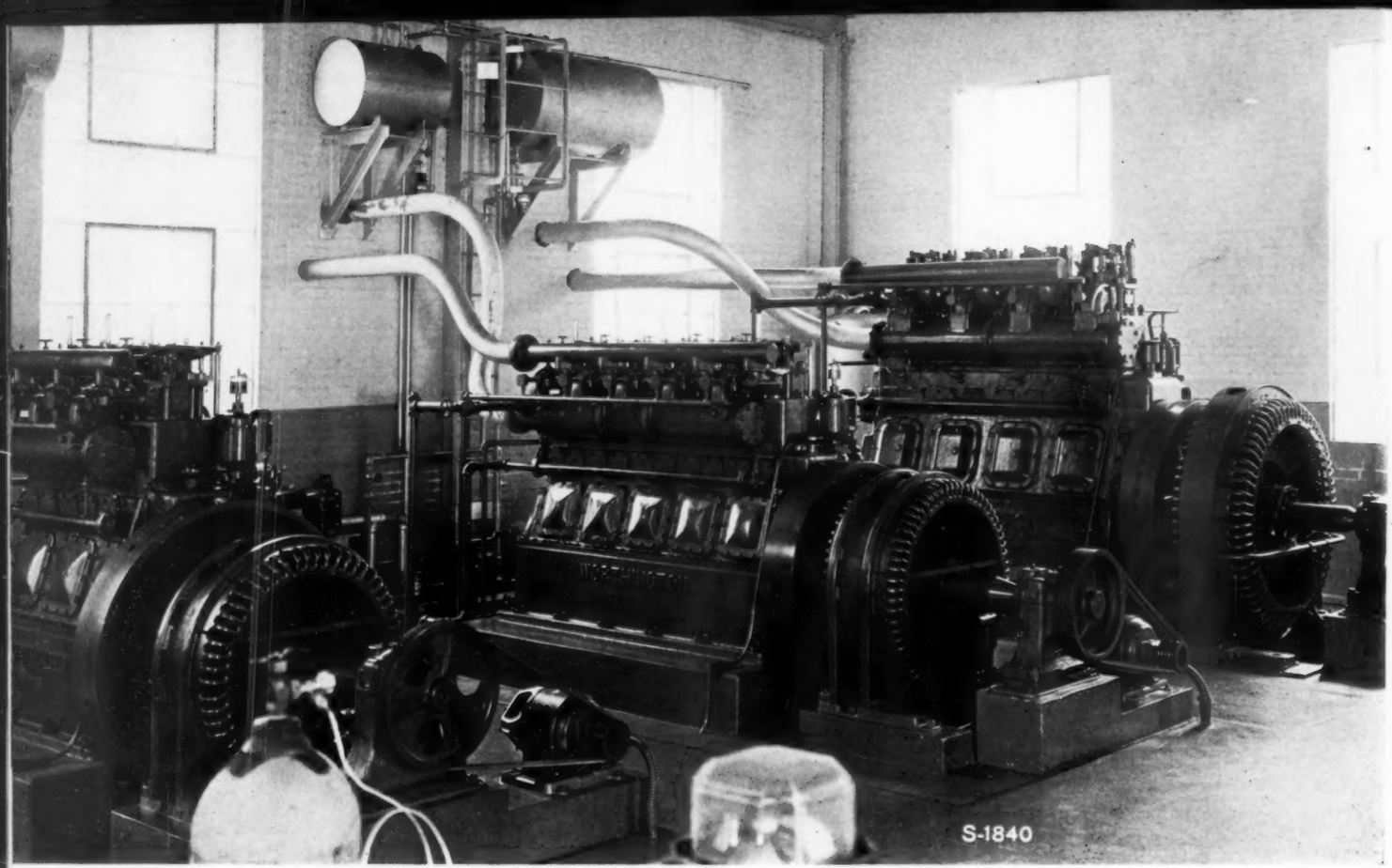
These Buckeye Diesels, with their all-enclosed construction and freedom from noisy exposed moving parts, are remarkably quiet in operation and are without perceptible vibration. Crankshafts are heavy, being of 6 in. diameter with six main bearings. Compressed air is employed for starting. Both engines are equipped with Alnor exhaust pyrometers.

Lubricating oil is filtered by Nugent pressure filters. For lubrication, Mr. Johnson has used both Macmillan Ring-Free and Atlas Alco, S A E 30 in each case, with satisfactory results. Lube consumption runs from 2,500 to 3,000 hp. hours per gallon.

As to fuel, Standard 30-32 Baume is used, delivered to the cylinders by American Bosch solid injection systems. Records show that 11 to 12½ kw. are produced to one gallon of fuel, with a monthly average output of from 80,000 to 90,000 kw. per month, making, as before stated, a net cost of power about 25% of the cost of purchasing commercial electricity.



*Above: Two views of the Diesel engines and Elliott generators. Note Alnor pyrometer on each of the engines, top view. Right: Close-up of generator, outboard bearing, and Vee belt exciter drive, also control board rear.*




*Interior view showing the three Worthington Diesels, General Electric generators and vee-belted exciters. Note Pickering governor on each engine.*

# RIVER JUNCTION, FLA.

*By* W. AUSTIN SMITH

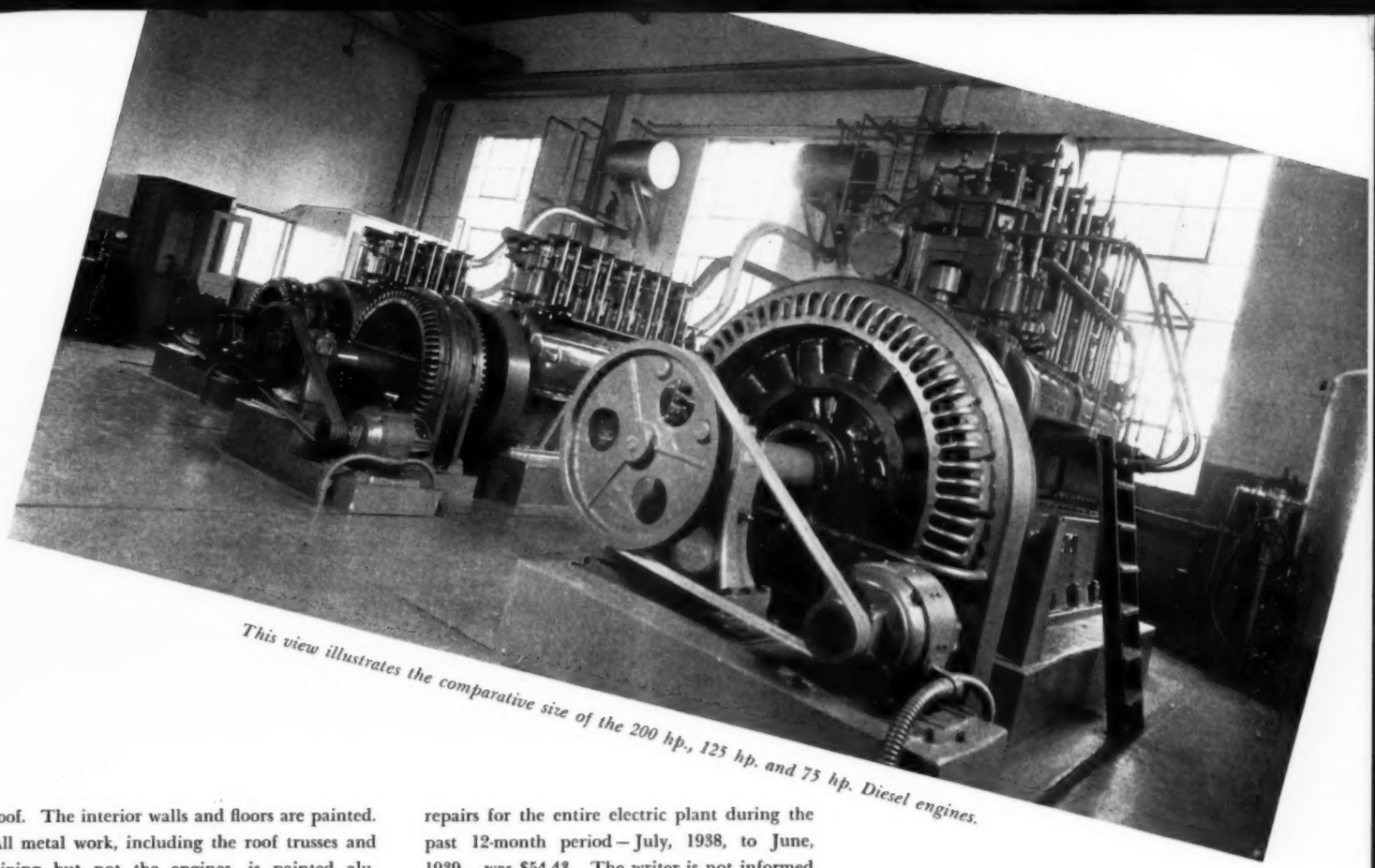
THE town of River Junction is located in the northwestern part of Florida on the Chattahoochee River. With a population of about 2,000, this little city is the home of many of the administration staff of the Florida State Hospital, which is in the adjoining community of Chattahoochee.

Until River Junction became the owner of its own electric power plant, it was purchasing electric power wholesale from the Florida State Hospital at Chattahoochee, Florida, at a flat rate of 5c per kwh. The town was also buying its water wholesale from the hospital at 16c per 1,000 gallons. In 1937, the town provided funds with which to build a Diesel engine power plant, drill a deep well, install pumping equipment, and construct a 200,000 gallon concrete surface reservoir. The town owned its own electric distribution system, and its own tank and water mains.

The new plant was located on a beautiful wooded tract of several acres bought for the purpose. Since this was to be a Diesel plant, the matter of railway facilities did not play a part in the selection of the site. The factors determining the location of the plant were, first, the availability of this site with sufficient acreage upon which to build a future civic center, containing a City Hall, fire station and space for a beautiful park area. The second consideration was that this site is near the center of load distribution and three well-balanced circuits could be run from the switchboard with practically no rearrangement of the outside lines. The town takes a great deal of pride in the proposed center and as time and progress permit, this location will become a show-spot.

Reference was made to the location not being dependent upon railway facilities. Investigations were made as to fuel deliveries and it was found that the oil companies could make truck deliveries to the plant at better prices than they could make deliveries by other means. This fact made it possible to eliminate the transportation factor in selecting a site. Fuel is stored in two 10,000 gallon tanks and is unloaded by gravity from the trucks. This, of course, would not have been possible with a steam plant.

Before describing the engines, it is interesting to note that the cooling water for the engines is obtained from a spring on the property, from which the water flows by gravity to produce make-up for the cooling basin. The cooling water is then circulated over a cooling tower above this basin. The hardness of the town's deep well water made the use of this soft spring water desirable. The building is brick, sixty feet long and forty feet wide, designed on power plant lines with a Robertson factory type



*This view illustrates the comparative size of the 200 hp., 125 hp. and 75 hp. Diesel engines.*

roof. The interior walls and floors are painted. All metal work, including the roof trusses and piping but not the engines, is painted aluminum. The appearance of the plant is pleasing and after two years of operation, it is gratifying to find that the operators take a pride in keeping the plant neat, clean, and in trim.

The Diesel engine plant consists of one 200 bhp., one 125 bhp., and one 75 bhp. Worthington engines, driving respectively one 169, one 106 and one 62 kva. General Electric generators with belt-driven exciters. The switchboard consists of separate panels for the generator sets, a voltage regulator panel, one house panel, and two outside distribution panels. All outgoing circuits are metered, the house use is metered, and the total power generated is metered, thereby giving the plant operations complete information for records. The principal auxiliary equipment on the three Worthington engines consists of Pickering governors, Cuno fuel oil filters and lube oil filters, a De Laval centrifugal oil purifier, Andale lube oil coolers, Maxim silencers, a 17 pt. Alnor pyrometer, a Schubert-Christy cooling tower, Crane valves.

The 200 hp. Worthington engine is of 4-cylinder type vertical, 4-cycle, direct injection, direct-connected to the generator. The 125 hp. is a Worthington B-5, and the 75 hp. is a type B-3. These engine-generator sets were erectel under supervision of a factory representative and were started and took the load at the beginning with no difficulty except for minor adjustments. For two years these engines have been operating. The total cost for parts and repairs for the entire electric plant during the past 12-month period — July, 1938, to June, 1939 — was $54.43. The writer is not informed whether or not any of this expenditure was actually on the engines.

In reading the following operating costs for the two years since the plant started operation, it should be held in mind that the plant is operating on a very low load factor. The load will eventually be built up, but the Town Council will have to revamp the rate schedules, which will eventually come. When this plant begins operating upon a better load factor, quite different results will be found in the following tabulation. The town is greatly pleased at the almost unbelievable net savings effected by this plant. The amount shown as savings in the columns below is net profit to the town, since the town was actually paying these large amounts out for electric power before acquiring its own plant.

These figures are based upon the plant at a very low load factor. When the load is built up to permit the engines to operate at a good load factor, the fuel consumption will reach a more desirable point.

The town is now pumping water with its own equipment whereas it was bought wholesale. After deducting the debt service cost upon an investment of $25,000 for water pumping equipment, mains and a reservoir, and cost of an operator at the plant, the annual net savings amount to over $500 each year.

This article has made no attempt to show a financial statement. It deals only with production costs. The savings shown in the tabulation below are in production cost over the old purchase of power wholesale. While the town shows a very fine profit on its utilities, it is not the object of this article to deal with that.

OPERATING COSTS

| | *1st Year* | *2nd Year* |
|---|---|---|
| Kwh. generated | 319,200 | 330,000 |
| Fuel oil used | 27,302 | 32,132 |
| Kwh. per gallon fuel | 11.69 | 10.27 |
| Total cost at switchboard (including plant maintenance) | $ 5,141.64 | $ 4,214.43 |
| Cost per kwh. on switchboard | 16.1 mills | 12.8 mills |
| Pounds fuel per kwh. | .615 | .700 |
| Cost of fuel per gallon | $ 0.06 | $ 0.05 |
| Debt service and insurance | $ 1,890.00 | $ 2,163.24 |
| Cost of same power at old wholesale switchboard cost | $15,960.00 | $16,500.00 |
| Net savings at plant | $ 8,928.36 | $10,222.33 |

# AUTOMATIC CONTROLS

***For Single and Multiple Engines***

WITH the rapid rise of interest in, and the broadening field for application of multiple Diesels to generators and to compressors and other equipment, the need for automatic start, stop, and control devices has become tantamount to the overall performance of the machinery itself. Full automatic control of Diesel engines, particularly in multiple installations, is accomplished in a variety of ways with varying degrees of success. One of the newest and most promising control systems has been developed by Synchro-Start Products of Toledo, Ohio.

A complete automatic control system for either single or multiple Diesel engine installations should embody provisions for starting upon load demand, stopping upon cessation of load, optional selection of any engine as a lead engine in a bank, automatic starting and stopping of other engines in the bank according to load fluctuations, together with safety switch, signal lights and oil pressure and water temperature switches. Such a system is now available under the trade name "Synchro-Start." The dual engine control illustrated in Fig. 1 functions as follows:

Closing of a power demand switch will cause the individual control set to automatically open and close all the circuits to the functioning parts of the engine to get it started. The engine will be cranked at intermittent periods for a period of about 60 seconds, unless it fires before the time limit is up. The instant the engine fires, the control automatically disconnects the circuits controlling the starting and cranking units.

Should the engine fail to start in the time limit allowed for cranking, the control unit automatically disconnects all current to that engine and connects current to start automatically the stand-by engine. Should the main engine have started and run, and one of the safety switches operate on account of abnormal engine condition, the control will automatically operate as for engine failure to start, and light the signal indicating the cause of trouble. The signals, time elements, etc., automatically reset themselves by the opening and closing of the power demand switch.

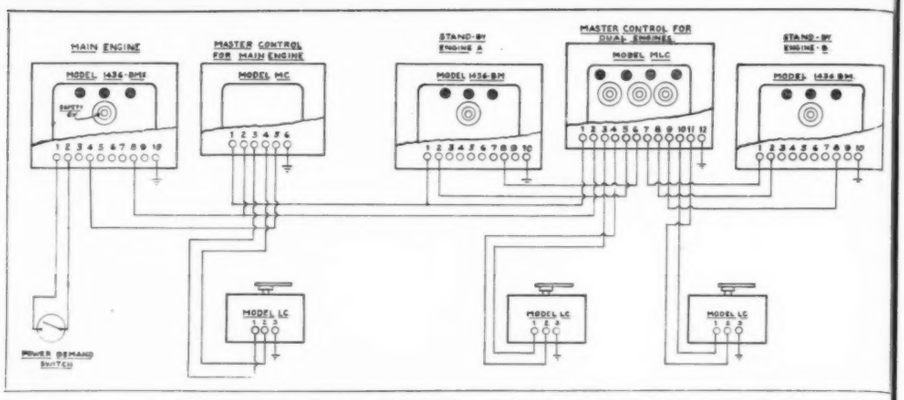



*Fig. 2*

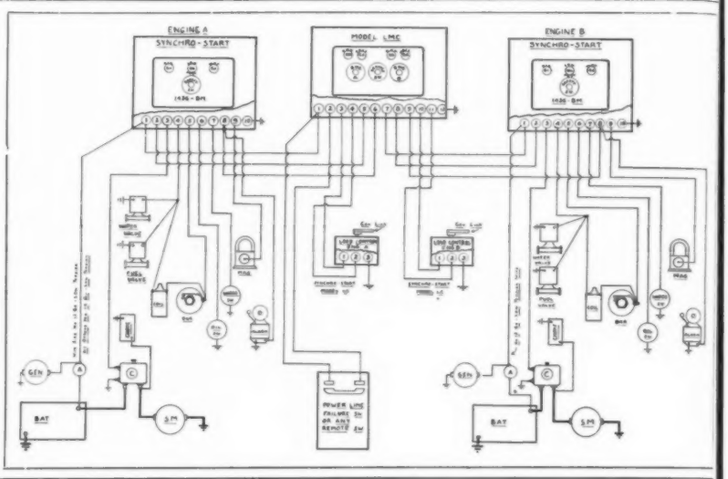
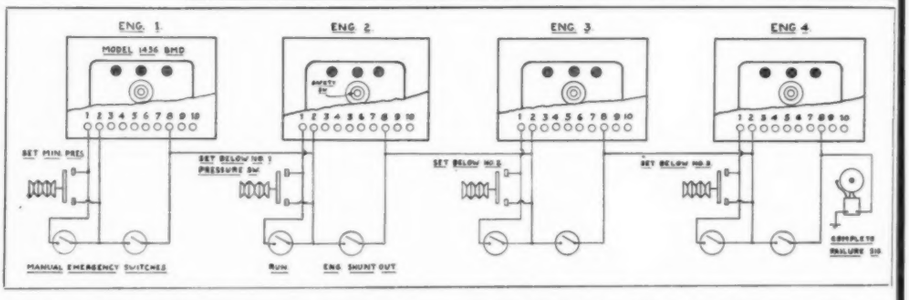



*Fig. 1*

*Fig. 3*




In the three engine-generator installations shown in Fig. 2 the controls would operate in the following sequence:

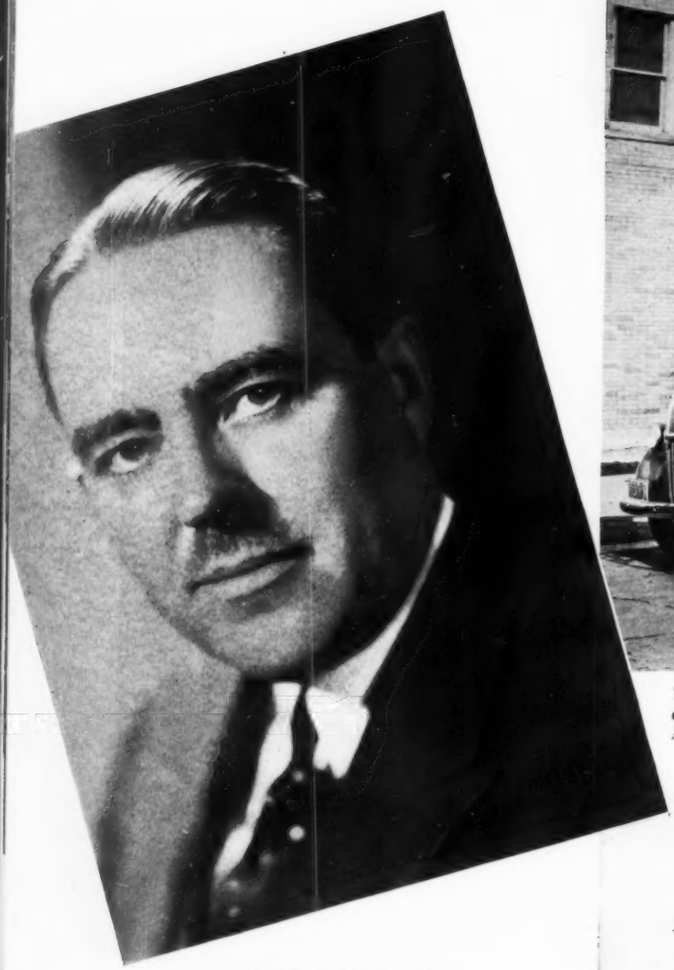
Closing of the power demand switch would put the main engine into service on the bus lines. When the maximum predetermined load on the main engine has been reached as per setting of the load control, engine "A" of the stand-by system will be started to assist the main engine. When the combined load of the main engine and engine "A" reaches a predetermined load on the engines, as per setting of the load control of engine "A," engine "B" will be started to assist main engine and engine "A."

As the load on the bus lines decreases, the stand-by engines will be stopped in proportion to the total load as set by the load controls. The power demand switch for the main engine may be a manually-operated switch or an automatic power failure switch.

Should the engines be driving DC generators, it will be necessary to use electrically operated circuit closures on each generator to connect it to the bus line for full automatic service. If the engines are driving AC generators, it would be necessary to have electrically-operated transfer switches and automatic synchronizers for each generator for full automatic operation.

These magnetic circuit closures should be normally opened and closed when the incoming generator voltage has been built up. The circuit to the operating coil of this switch passes through the control set and is made when the engine is started, and broken when the engine is stopped.

A four-engine compressor pressure control system is shown in Fig. 3. This control system is for the maintaining of pressure through the use of four engines connected to individual compressors and each unit containing a time delay of twenty seconds before starting or stopping any one of the four engines. This is for the purpose of avoiding unnecessary starting or stopping due to momentary load changes or temporary fluctuations. Any number of engines can be controlled likewise.



*RALPH K. MANGAN*
*Vice-President, The Buda Company.*

*The C.O.E. Ford chassis equipped with a 6-cylinder Buda-Lanova Diesel. Hauling 35,000 lbs. gross load between Chicago and Denver, fuel consumption averages 11½ miles per gal. Monthly saving over the former gasoline engine is about $120.00 per month.* →


*The 1940 conventional Ford chassis in which a 6-cylinder Buda-Lanova Diesel is installed. On one demonstration trip of 165 miles, the gross weight was 60,000 lbs., with fuel consumption of 15 gal., averaging 12 miles per gal. compared with 5 miles per gal. on a gasoline engine truck.*


# "INDUSTRY STANDARDIZING ON DIESELS—PRODUCING INCREASED DEMANDS ON MANUFACTURER"

## *Says R. K. Mangan, Vice-President, The Buda Company*

"THE Diesel industry faces bright prospects for the rest of 1940. Manufacturers and users of all types of engine-driven machines and equipment are more Diesel-minded than ever before. For several years, the majority of Diesel engines was sold for equipment to be used in foreign countries. But today, industry in general is standardizing on Diesels for both domestic and foreign use, and is thereby producing increased demands on the manufacturers of Diesel engines. In our case, this standardization is noticeable in all the major classifications of industry served by Buda; namely—automotive, oil field, portable industrial, stationary industrial, and marine.

"In the portable Industrial classification we are enjoying large increases, particularly in the shovel and tractor fields. These increases are in number of units as well as in dollar volume.

"Buda Automotive Diesel sales enjoyed a great gain in 1939 over previous years. We are sure 1940 will show an increase over 1939. One of the principal reasons for this increase is the development of a 6-cylinder package unit for both C.O.E. and conventional 1940 Ford trucks. We believe that the use of Buda-Lanova 6-cylinder Diesels in 1940 conventional Fords—as well as C.O.E. models—will be the outstanding achievement of the Diesel industry in 1940."

# NEW DEVELOPMENT ADDS MANY ADVANTAGES TO MORSE SILENT CHAIN DRIVES

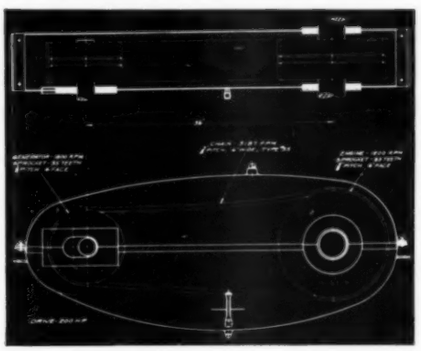
RECENT research work by Morse has resulted in a new understanding of the effect of the centrifugal loads created in chain drives when operated at speeds above 3,000 feet per minute.

Unlike flat or "V" belts, which begin to lose their grip upon the pulleys when belt speeds exceed 3,500 feet per minute, chains, at speeds up to almost double this speed, transmit power *without slip* and with amazing efficiencies in amounts almost proportional to the increased chain speed. These remarkable chain velocities are permissible when the smaller sprocket contains a relatively large number of teeth.

Naturally this limits the amount of speed reduction or step-up possible, but ratios up to 4:1 are not uncommon and many such drives are in successful operation. The outstanding application for these high velocity chain drives lies in the field where ratios are from 1:1 to 3:1, and where rotative speeds come within the range of 400 to 4,000 rpm.

On such applications the Morse Rocker Joint Silent Chain offers the ideal medium of power transmission having efficiencies higher than 99.5 per cent, noiseless operation, long and trouble-free life, space requirement less than half that of belt drive, 30 to 50 per cent less bearing load, and outstanding economy.

At these higher chain velocities, it has been found that the centrifugal tension in the chain



*Typical Hi-Speed drive and case (splash lube).*

is almost entirely reacted against by the sprocket teeth themselves and does not affect the working strand of the chain to an appreciable degree. Centrifugal force is actually utilized in that sprocket driving forces are distributed over a great number of teeth instead of a few, thus materially reducing sprocket wear. Because of the great space saving and lessened bearing and overhung loads, the Morse Rocker Joint Super Speed drives often make possible an otherwise difficult transmission problem.

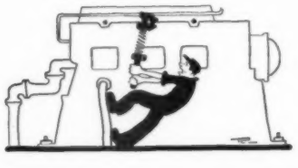
Good lubrication (pump or bath lubrication with an oil-tight chain case) is essential. Morse has developed several types of chain cases including the standard chain case, disc oiler case, ring oiler case, also a pump lubrication system including a sump.

These chain cases, beside serving to lubricate the drives in the manner indicated by their designation also protect the drive from dust and dirt and provide safety enclosures.

## REINER & CO. IN NEW QUARTERS

FORMERLY at 29 Howard St., New York, John Reiner & Co., Inc., is now doing business in its modern, three story plant at 12-12 37th Ave., Long Island City. Widely known as builders of Diesel Marine auxiliary units, having been in this business the last twelve years, Reiner & Co. outgrew the facilities of the old location.


This new plant and its equipment place Reiner & Co. in a position to not only maintain its high standards but to meet the rapidly growing demands of the marine fields.



## NEW SPACE-SAVING DIESEL-ELECTRIC UNIT ANNOUNCED BY LISTER-BLACKSTONE

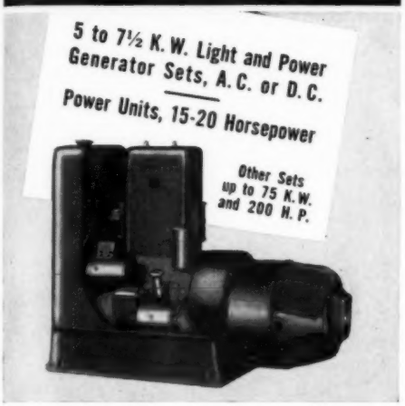
"POWR-PAK," a new line of Diesel-electric power plants ranging in size from 3,600 to 24,000 watts and built to a simple, yet revolutionary space-saving design, is now being placed on the market by Lister-Blackstone, Inc.

These new plants consist of a radiator-cooled engine, generator and control panel, all assembled in compact form, ready to set in place and put to work. Chief change from conventional design is in the placement of the generator, which sets directly underneath the engine and thus cuts the floor space requirements almost in half.

Power for generating is supplied by the famous Lister 4-cycle Diesel engine using American Bosch fuel system. To assure long engine life, the cylinder walls are chromium impregnated by the Listard process. The patented dual-com-

. . . . *And now please turn to page 64*

# NOW!
# DIESEL ECONOMY IN SMALL PACKAGES WITH HILL DIESEL GENERATOR SETS




Power and light economy is no longer confined to those with giant power plants. Thousands of Factories, Mines, Camps and Service Stations, and other thousands of Farms, Quarries and small manufacturers can now make their own power, at low cost Diesel Power prices, in quantities small enough for their needs.

Hill 2R and 4R Generator Sets will blanket the small power market from 5 to 20 Kilowatt — 15-30 HP. These units will be available as bare engine for direct power hook-up — with generators for light and power and as marine engines for propulsion.

Dealers, write us now if you want the liveliest dealer opportunity yet offered in the Diesel Field.

*Users,* send at once for details and prices, sending average electric bill for estimate of probable savings.

**HILL DIESEL ENGINE COMPANY**
R. E. OLDS, *Chairman*
254 Mill Street • Lansing, Michigan

**HILL DIESEL**

# ALSO on the RUSSELL...

## duplicate *electrical* R.P.M. Indication in Both ENGINE and CONTROL ROOMS!



**WESTON ELECTRICAL TACHOMETERS**

**WESTON Indicators are available in various sizes and shapes, with scales calibrated in any range of R.P.M.**

On the new RUSSELL, too, the WESTON Electrical Tachometer provides the extra benefit of *duplicate* R.P.M. indications, at but slight extra expense. One R.P.M. indicator is mounted in the lower engine room — another in the engine control room. Both are wired to one engine-mounted magneto; the wiring easily run through existing conduit. » » » Duplicate indication, however, is but one of the many reasons why Diesel builders have adopted WESTON *electrical* R.P.M. indication. It's far easier to install, and easier to maintain—because of the absence of drive shafting and other mechanical parts. It's more accurate, too, because the magneto-indicator relationship is unvaryingly proportional, and because the pointer responds, instantly and smoothly, to any change in speed.

Complete information on electrical R.P.M indication, for single or duplicate installations, gladly sent on request. Write to Weston Electrical Instrument Corporation, 579 Frelinghuysen Avenue, Newark, New Jersey.

# WESTON
## *Electrical* TACHOMETERS

pression system used on Lister Diesels makes starting by hand easy under all temperature conditions, without the use of punks, glow plugs, or any other preheating devices, the manufacturers say.

Generators are available in any desired voltage or current, either D. C. or single or three phase A. C., for stationary or marine service.

For further information and descriptive literature, write Lister-Blackstone, Inc., 1706 South 68th Street, Milwaukee, Wisconsin.

## U. S. ARMY DIESEL LAUNCHES

PALMER SCOTT & Co. Inc., New Bedford, Mass., recently completed and delivered to the Army Base, Brooklyn, for the United States Army, five 40-ft. Diesel engined launches. These boats are built after the lines of the standard Navy Motor Sailers.

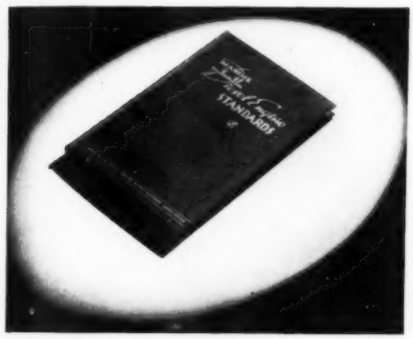
These launches are powered with 6-cylinder Buda Diesels, DTMR-468, driving through two to one reduction gears. They swing a 28 in.

diameter wheel, with 20 in. pitch. Wide open, the engines turning 1500 rpm., the boats make 10.53 statute miles per hour. Speaking of the delivery voyage, Mr. Palmer Scott says "We ran the boats under their own power from New Bedford to the Army Base in Brooklyn, starting at ten minutes of eight Sunday morning, March 17th, arriving 9:30 Monday morning. We arrived at New London at 3:30 in the afternoon, put in for a hot meal, leaving New London at eight o'clock that evening, stopping at Burs Yacht Landing.

"It was my first experience with a Diesel engine and I, personally, was delighted with its operation. The men on the other four boats were also highly pleased with the engine. In the total run, we used about 68 gallons of fuel. We kept the engines turning at 1200 rpm.'s, which gave us an average speed of 9 statute miles per hour. These boats are extremely heavy for their size and I consider their performance excellent. One feature that amazed me more than anything else was that these engines in cold weather would start quicker than most marine gasoline engines that I have ever used."

## BOOK REVIEW

MARINE DIESEL ENGINE STANDARDS, 144 pages, 6⅛" x9¼", published April 1, 1940, by the Diesel Engine Manufacturers' Association. Price $2.00. This sequel to STANDARD PRACTICES for stationary Diesels offers for the first time in the marine field an authentic standardization of terminology and practice for both main and auxiliary Diesel engines. Beginning with a brief history of marine Diesel engines and a comparison with steam propulsion, it covers standard performances, equipment and definitions generally. Design and construction of marine Diesels are treated from the standpoint of the prospective purchaser to enable him to evaluate competitive bids fairly and correctly. This chapter is of assistance also in preparing specifications for bidding.




Classification and marine inspection of ships is explained in clear and understandable terms, which give a concise digest of responsibilities and procedure in this connection.

Marine Diesel applications are fully covered for all types of ships and all types of drives with drawings and diagrams to supplement the text. The relative advantages and disadvantages of each type are set forth. Other subjects treated include fuel oil, fuel oil systems, foundations and seatings, propellers and torsional vibration, starting systems, cooling systems, lubricating oil systems, and air intake and exhaust systems.

Although this new book is copyrighted, naval architects and marine engineers are cordially invited to use any parts of it in their specifications, with or without acknowledgement to the publishers. They, as well as ship owners and operators, will find the answers to many previous misunderstandings clearly stated.

Use the convenient coupon on page 72 of this issue and send in your order today. This is a book you should have.

## FULL LINE OF DIESEL-POWERED TRUCKS BY REO

REO'S 1940 truck program has been further augmented by a complete line of five Diesel-powered models ranging in capacity from 13,000 lbs. to 22,000 lbs. with corresponding tractor ratings.

Each model will be built in three standard wheelbases of 120, 145 and 165 inches. Due to Reo's new design, 9, 12 and 15 ft. bodies can be mounted on these wheelbases with ideal weight distribution. Optional wheelbases are obtainable on special order.

Buda-Lanova Diesel engines will be standard. Engines that will give you smoother operation, dependability, 4-cycle efficiency, low operating and maintenance costs. Displacement of these engines are 226, 294, 317, 389 and 468 cubic inches.

Transmissions are four or five speed or helical and spur gear design, providing quiet operation and easy shifting. Three types of axles—spiral bevel, double reduction and two-speed double reduction are available on each model. The interchangeability of major assemblies makes it possible to have custom-built unit fitted to a particular operation at production prices.

Special consideration has been given to driver comfort in designing the new all-steel cab. Plenty of leg room. The instrument panel is all-steel construction with instruments clustered in center. Handy compartments are on each side.



## NEW ENTERPRISE CATALOG

THE Enterprise Engine Company of San Francisco, California, has recently issued a very interesting and well-illustrated catalog on their line of Type DMQ marine Diesel engines. Copies of this catalog will be promptly and gladly mailed if you will send your inquiry on your business letterhead to the Enterprise Engine Company, San Francisco, California.

## DIESEL-DRIVEN CARGO PUMPS FOR NEW TANK BARGES

THE two 210′ x 42′ x 14′ tank barges recently reported under construction at the yard of the newly formed R.T.C. Shipbuilding Company at Camden, New Jersey, will each be equipped with two 8 in. Northern rotary cargo pumps each with a capacity of 1150 gpm. when operating at 359 rpm. Each pump will be driven by a 4-cylinder Atlas Imperial 4-cycle 7″ x 8½″ Diesel engine rated 75 hp. at 600 rpm. The tank barges will each have a cargo capacity of 17,000 barrels.

## NEW PUMP INJECTION BOOK

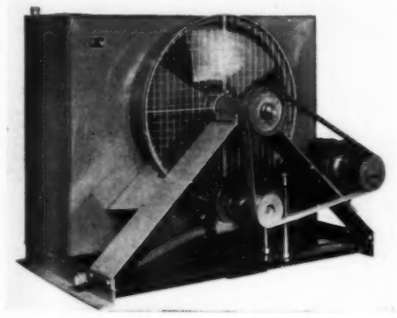
THE Pennsylvania State College Engineering Experiment Station has printed a bulletin on "Experiments on Jerk-Pump Injection" by Professor Kalman J. DeJuhasz. To our readers interested in this subject, we heartily recommend this bulletin, copies of which may be obtained by remitting 75c to the Engineering Experiment Station, State College, Pa., and asking them to send you Series Bulletin No. 51.

## STURTEVANT DIESEL AND GAS ENGINE COOLERS

DESIGNED for use with Diesel engines, gas engines, and compressor units, and specifically intended for rugged service in the oil fields, Sturtevant engine coolers are built to stand up under severe operating conditions as well as to reduce operating costs to a minimum.

Sturtevant engine coolers operate on a closed system. Improved cooling with rapid circulation also eliminates accumulated scale in the engine jacket or pipe lines. During winter months, anti-freeze may be added to the water in the cooling system. Water temperatures are readily controlled to prevent over-cooling in winter, and in summer, with temperatures as hight as 110° F., proper water temperatures will be maintained.

In addition to engine cooling, Sturtevant engine coolers provide ventilation and cooling of the engine room during the summer by bringing in fresh outside air and discharging heated indoor air to the exterior of the building through the cooling coils. In winter, the outside air intake may be closed off by means of a sliding panel or louvres, and recirculating indoor air passed through the unit will provide heat for the interior of the building.



*The Sturtevant Diesel and Gas Engine Cooler.*

The unit consists of a fan, made from a one-piece steel stamping in the smaller sizes and of cast aluminum in the larger sizes, a cooling unit made of copper alloy header and extended surface tubes, a circulating pump and a drive arrangement which is adaptable for motor or engine crankshaft propulsion of the fan and pump.

Complete details of this Sturtevant engine cooler may be secured by writing the B. F. Sturtevant Company, Hyde Park, Boston, Mass., and asking for Bulletin 418-4.

## POWER INCREASE DISCLOSED IN NEW "DODGE AND DIESEL" EDITION

COMPLETELY revised and containing graphic new illustrations, the 1940 edition of "Dodge and Diesel" has just come off the press.

Written by Dodge-Diesel engineers in collaboration with sales executives, the "Dodge and Diesel" booklet is devoted to an explanation of Diesel engines in general and the Dodge Job-Rated Diesel in particular. All technical points of Diesel design and construction are described in simple language easily understood by the layman. The booklet is available from all Dodge dealers or from the factory merchandising department in Detroit.

## COLONEL ROCKWELL ELECTED BANK DIRECTOR

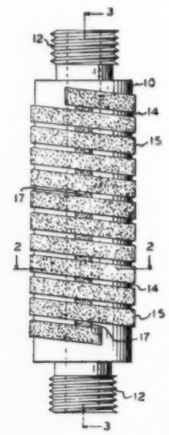
COLONEL W. F. ROCKWELL, president of the Pittsburgh Equitable Meter Co. and Merco Nordstrom Valve Co., has been elected a director of the Commercial National Bank and Trust Co. of New York.

# Latest Diesel Patents

*A description of the outstanding patented inventions on Diesel and Diesel accessories as they are granted by the United States Patent Office. This information will be found a handy reference for inventors, engineers, designers and production men in establishing the dates of record, as well as describing the important Diesel inventions.*

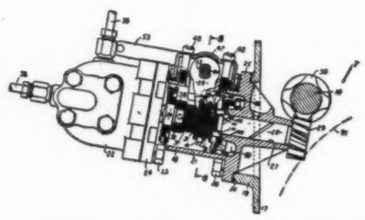
*Conducted by* C. CALVERT HINES*

2,167,811
PISTON
John N. Martin, Tulsa, Okla.
Application August 12, 1937, Serial No. 158,766
8 Claims. (Cl. 309—4)




6. A piston comprising a cylindrical body, a helical member rigidly united with the outer surface of said body and extending laterally therefrom, the convolutions of said member being spaced apart forming a helical groove about said body, a continuous packing element mounted in said groove in fluid-tight engagement therein throughout its length and protruding radially thereof, and discontinuous packing elements mounted between adjacent convolutions of said packing element and in fluid-tight engagement therewith, said discontinuous packing elements protruding radially to the outer periphery of said continuous packing element.

2,169,334
POWER TAKE-OFF FOR ENGINE-DRIVEN MECHANISMS
Oscar U. Zerk and Daniel Roland Vanneman, Chicago, Ill.; said Vanneman assignor to said Zerk
Application July 1, 1935, Serial No. 29,336
Renewed July 12, 1938
7 Claims. (Cl. 74—11)



1. In combination with an internal combustion engine having an apertured walled casing and a cam shaft, and a valve tappet mechanism, an

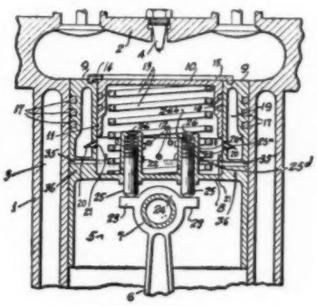
*Patent Attorney, 811 E. Street, N.W., Washington, D.C.

accessory mechanism frame, a mechanism on the frame and a mechanism driving shaft having a gear thereon projecting from the shaft all supported solely by the frame as a unitary self-contained structure, the shaft adapted to be projected through the apertured casing wall to drivingly engage the gear with the cam shaft gear and the frame adapted to be detachably secured to the engine casing, and extending laterally therefrom, the mechanism and frame being disposed with all parts thereof below the lowest plane in which operations are performed to adjust the valve tappet mechanism, the mechanism comprising a clutch associated with the mechanism shaft and a vertically movable clutch operating element disposed laterally outwardly of the engine beyond the space in which operations are customarily performed to adjust the valve tappet mechanisms, and link means associated with the operating element for effecting movement thereof manually preventing movement of the clutch operating element to a clutch engaged position by the link means above a predetermined rotational speed of the cam shaft gear.

2,170,266
PISTON FOR INTERNAL COMBUSTION ENGINES

Edward E. Leissner, New York, N. Y., assignor of one-half to Arthur J. Schossberger, New York, N. Y.

Application June 12, 1937, Serial No. 147,813
8 Claims. (Cl. 123—78)

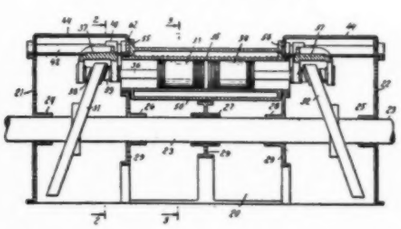


1. In an internal combustion engine, a hollow, double-headed piston having a pump for sucking air and oil, thereby dissipating the heat thereof.

2,170,058
INTERNAL COMBUSTION ENGINE

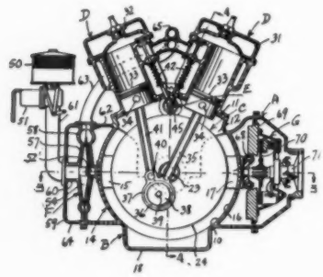
Elwood T. Larkin, Buffalo, N. Y., assignor to Michell-Crankless Engines Corporation, New York, N. Y., a corporation of New York

Application April 21, 1937, Serial No. 138,145
8 Claims. (Cl. 123—58)



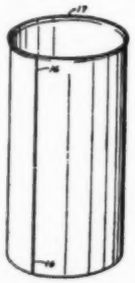
1. In crankless mechanism of the character described, a casing, a shaft mounted in said casing and extending longitudinally thereof, said casing having a longitudinal opening therein, and a cylinder movable through the opening into the casing and supported on the longitudinal walls of the casing surrounding said opening, in a position parallel to said shaft.

2,169,120
INTERNAL COMBUSTION MOTOR
Robert Stribling Busby, West Palm Beach, Fla.
Application May 2, 1938, Serial No. 205,598
4 Claims. (Cl. 123—197)



1. In an internal combustion engine, a flywheel shaft, a pair of flywheels each fixed at an opposite end of the flywheel shaft, said flywheels being provided on their outer faces each with a crank pin, a pair of spaced apart cylinder assemblies having pistons each operatively connected to one of said crank pins, gearing on the inner face of one of the flywheels, a drive shaft having an end portion disposed between said flywheels, and gearing on the end portion of the drive shaft meshing with the flywheel gearing.

2,170,015
INTERNAL COMBUSTION ENGINE
Henry Ford, Dearborn, Mich., assignor to Ford Motor Company, Dearborn, Mich., a corporation of Delaware
Application June 9, 1938, Serial No. 212,724
6 Claims. (Cl. 309—3)



1. An internal-combustion engine having a cylinder bore therein into which a thin wall cylinder liner is expanded under relatively high pressure, said liner being formed with a parting line extending the length thereof, the material of the liner on each side of said parting line being fastened together only at spaced intervals therealong, for the purpose described.